UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

Making Data Meaningful

Part 1

A guide to writing stories
about numbers

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NOTE

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Introduction

Making Data Meaningful Part 1: A guide to writing stories about numbers was prepared within the framework of the United Nations Economic Commission for Europe (UNECE) Work Session on Statistical Dissemination and Communication[1], under the programme of work of the Conference of European Statisticians[2].

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About this guide

The guide is intended as a practical tool to help managers, statisticians and media relations officers use text, tables, graphics and other information to bring statistics to life using effective writing techniques.

It contains suggestions, guidelines and examples – but not golden rules.

This publication recognizes that there are many practical and cultural differences among statistical offices, and that approaches vary from country to country.

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[1] Information about the UNECE Work Session on the Communication and Dissemination of Statistics is available from the UNECE website at http://www.unece.org/stats/archive/04.05.e.htm.

[2] Information about the Conference of European Statisticians is available from the UNECE website at http://www.unece.org/stats/archive/act.00.e.htm.

1. What is a statistical story?

On their own, statistics are just numbers. They are everywhere in our life. Numbers appear in sports stories, reports on the economy, stock market updates, to name only a handful. To mean anything, their value to the person in the street must be brought to life.

A statistical story is one that doesn't just recite data in words. It tells a story about the data. Readers tend to recall ideas more easily than they do data. A statistical story conveys a message that tells readers what happened, who did it, when and where it happened, and hopefully, why and how it happened. A statistical story can

- provide general awareness/perspective/context;
- inform debate on specific issues.

In journalistic terms, the number alone is not the story. A statistical story shows readers the significance, importance and relevance of the most current information. In other words, it answers the question: *Why should my audience want to read about this?*

Finally, a statistical story should contain material that is newsworthy. Ask yourself: Is the information sufficiently important and novel to attract coverage in the news media? The media may choose a different focus. But they have many other factors to consider when choosing a story line.

Statistical story-telling is about:

- catching the reader's attention with a headline or image;
- providing the story behind the numbers in an easily understood, interesting and entertaining fashion;
- encouraging journalists and others to consider how statistics might add impact to just about every story they have to tell.

2. Why tell a story?

A statistical agency should want to tell a story about its data for at least two reasons. First, the mandate of most agencies is to inform the general public about the population, society, economy and culture of the nation. This information will guide citizens in doing their jobs, raising their families, making purchases and in making many other decisions.

Secondly, an agency should want to demonstrate the relevance of its data to government and the public. In such a way, it can anticipate greater public support for its programs, as well as improved respondent relations and greater visibility of its products.

Most agencies rely mainly on two means of communicating information on the economic and social conditions of a country and its citizens: the Internet and the media.

The Internet has become an important tool for making access easier to the agency's information. More and more members of the public access an agency's data directly on its website. Still, most citizens get their statistical information from the media, and, in fact, the media remain the primary channel of communication between statistical offices and the general public.

An effective way for a statistical office to communicate through both means is to tell a statistical story that is written as clearly, concisely and simply as possible. The goal for the Internet is to better inform the public through direct access. When writing for the media, the aim is to obtain positive, accurate and informative coverage.

Statistics can tell people something about the world they live in. But not everyone is adept at understanding statistics by themselves. Consequently, statistical stories can, and must, provide a helping hand.

Last, but certainly not least, the availability of statistics in the first place depends on the willing cooperation of survey respondents. Statistical agencies cannot just rely on their legal authority to ensure a suitable response rate.

The availability of statistics also depends on the extent to which survey respondents understand that data serve an important purpose by providing a mirror on the world in which we live. The more a statistical agency can show the relevance of its data, the more respondents will be encouraged to provide the data.

3. Considerations

Statistical agencies must take into account a number of key elements in publishing statistical stories.

First, the public must feel that it can rely on its national statistical office, and the information it publishes. Statistical stories and the data they contain must be informative and initiate discussion, but never themselves be open to discussion. In other words, the information must be accurate and the agency's integrity should never come into question.

Statistical agencies should always be independent and unbiased in everything they publish. Stories must be based on high-quality data which are suitable to describe the issues they address. Changes in statistical values over time, for example, should be discussed only if they are determined by statisticians to be statistically significant.

Agencies should always guarantee the confidentiality of data on individual persons or businesses. Indeed, statistical stories may not identify, or in any way reveal, data on individuals or businesses.

In their statistical storytelling, agencies must take into account the position and feelings of certain vulnerable groups in society. Information on these groups should be made available, but the goal should always be to inform the public. Agencies should never seek publicity for themselves at the expense of these particular target groups.

The authors of this guide suggest that statistical agencies should, for the benefit of the citizens they serve, formulate a policy that explains how their practices protect the privacy and confidentiality of personal information. This policy should be given a prominent position on the agency's website.

4. How to write a statistical story

Do you have a story?

First and foremost, you need a story to tell. You should think in terms of issues or themes, rather than a description of data. Specifically, you need to find meaning in the statistics. A technical report is not a story, nor is there a story in conducting a survey.

A story tells the reader briefly what you found and why it is important to the reader. Focus on how the findings affect people. If readers are able to relate the information to important events in their life, your article becomes a lot more interesting.

Statistical offices have an obligation to make the data they collect useful to the public. Stories get people interested in statistical information and help them to understand what the information means in their lives. After they read good statistical stories, people should feel wiser and informed, not confused.

Possible topics/themes for stories:

- Current interest (policy agenda, media coverage, etc.);
- Reference to everyday life (food prices, health, etc.);
- Reference to a particular group (teens, women, the elderly, etc.);
- Personal experiences (transportation, education, etc.);
- Holidays (Independence Day, Christmas, etc.);
- Current events (statistics on a topic frequently in the news);
- Calendar themes (spring, summer, etc.);
- New findings;
- A regular series ("This is the way we live now", "Spotlight on xxxx", etc.).

Write like a journalist: The "inverted pyramid"

How can statisticians communicate like journalists? By writing their stories the way journalists do. The bonus is that the media are more likely to use the information.

Journalists use the "inverted pyramid" style. Simply, you write about your conclusions at the top of the news story, and follow with secondary points in order of decreasing importance throughout the text.

Think of a typical analytical article as a right-side-up pyramid. In the opening section, you introduce the thesis you want to prove. In following sections, you introduce the dataset, you do your analysis and you wrap things up with a set of conclusions.

Journalists invert this style. They want the main findings from those conclusions right up top in your news story. They don't want to have to dig for the story.

You build on your story line throughout the rest of the text. If the text is long, use subheadings to strengthen the organization and break it into manageable, meaningful sections. Use a verb in subheadings, such as: "Gender gap narrows slightly."

The lead: Your first paragraph

The first paragraph, or lead, is the most important element of the story. The lead not only has to grab the reader's attention and draw him or her into the story, but it also has to capture the general message of the data.

The lead is not an introduction to the story. On the contrary, it should tell a story about the data. It summarizes the story line concisely, clearly and simply.

It should contain few numbers. In fact, try writing the first sentence of the lead using no figures at all.

Don't try to summarize your whole report. Rather, provide the most important and interesting facts. And don't pack it with assumptions, explanations of methodology or information on how you collected the data.

The lead paragraph should also place your findings in context, which makes them more interesting. Research shows that it is easier to remember a news report if it establishes relevance, or attempts to explain a particular finding. Exercise caution, though. It is not a good idea to speculate, especially if your statistical office cannot empirically establish causality, or does not produce projections.

Give enough information so the reader can decide whether to continue reading. But keep it tight. Some authors suggest five lines or fewer – not five sentences – for the opening paragraph.

> **Poor:** A new study probes the relationship between parental education and income and participation in post-secondary education from 1993 to 2001.

> **Good:** Despite mounting financial challenges during the 1990s, young people from moderate and low-income families were no less likely to attend university in 2001 than they were in 1993, according to a new study.

Finally: there is no contradiction between getting attention and being accurate.

Remember:
- Focus on one or two findings;
- Write in everyday language (the "popular science" level);
- Create images for your readers;
- Focus on the things you want readers to remember;
- Choose the points you think are newsworthy and timely.

Good writing techniques

Write clearly and simply, using language and a style that the layperson can understand. Pretend you are explaining your findings to a friend or relative who is unfamiliar with the subject or statistics in general. Your readers may not be expert users who often go straight to the data tables.

Terms meaningful to an economist may be foreign to a layperson, so avoid jargon. Use everyday language as much as possible. If you have to use difficult terms or acronyms, you should explain them the first time they are used.

Remember: on the Internet, people want the story quickly. Write for the busy, time-sensitive reader. Avoid long, complex sentences. Keep them short and to the point. Paragraphs should contain no more than three sentences.

Paragraphs should start with a theme sentence that contains no numbers.

> **Example:** Norway's population had a higher growth last year than the year before. The increase amounted to 33,000 people, or a growth rate of 0.7%.

Large numbers are difficult to grasp. Use the words millions, billions or trillions. Instead of 3,657,218, write "about 3.7 million." You can also make data simpler and more comprehensible by using rates, such as per capita or per square mile. Some suggestions follow.

Use:

- Language that people understand;
- Short sentences, short paragraphs;
- One main idea per paragraph;
- Subheadings to guide the reader's eye;
- Simple language: "Get," not "acquire." "About," not "approximately." "Same," not "identical";
- Bulleted lists for easy scanning;
- A good editor. Go beyond Spell-Check; ask a colleague to read your article;
- Active voice. "We found that…" Not: "It was found that....";
- Numbers in a consistent fashion: For example, choose 20 or twenty, and stick with your choice;
- Rounded numbers (both long decimals and big numbers);
- Embedded quotes (these are sentences that generally explain "how" or "why", and which journalists like to use verbatim in their news stories in quotes);
- URLs, or electronic links, to provide your reader with a full report containing further information.

Avoid:

- ✘ "Elevator statistics": This went up, this went down, this went up;
- ✘ Jargon and technical terms;
- ✘ Acronyms;
- ✘ All capital letters and all italics: Mixed upper and lower case is easier to read;
- ✘ "Table reading", that is, describing every cell of a complex table in your text.

Not Good:	From January to August, the total square metres of utility floor space building starts rose by 20.5% from the January to August period last year.
Better:	In the first eight months of 2004, the amount of utility floor space started was about 20% higher than in the same period of 2003.

Headlines: Make them compelling

If your agency's particular style calls for a headline on top of a statistical story, here are some suggestions to keep in mind.

Readers are most likely to read the headline before deciding to read the full story. Therefore, it should capture their attention. The headline should be short and make people want to read on. It should say something about the findings presented in the article, not just the theme.

Write the headline after you have written your story. Headlines are so important that most newspapers employ copy editors who craft the headlines for every story. Because the information is likely new to them, these editors can focus more readily on the most interesting aspects of the story.

In the same vein, statistical agencies might consider a similar arrangement. The individual who writes the headline could be different than the story's author.

Headlines should:
- Be informative, appealing, magnetic, interesting and newsy, and incorporate:
  - the highest since, the lowest since…;
  - something new;
  - the first time, a record, a continuing trend;
- Make you want to read the story, not scare you off;
- Summarize the most important finding;
- Be no longer than one line of type;
- Not try to tell everything;
- Contain few numbers, if any at all;
- Have a verb or implied verb.

Not Good:	New report released today (the report is not the news)
	Energy conservation measures widespread (too vague)
	Prices up in domestic and import markets (what prices?)
Good:	Gasoline prices hit 10-year low
	Crime down for third year in a row
	July oil prices levelled off in August

Tips for writing for the Internet

The principles of good writing also apply to writing for the Internet, but keep in mind some additional suggestions.

People scan material on the Internet. They are usually in a hurry. Grabbing their attention and making the story easy to read are very important.

You also have different space limitations on the Internet than on paper. Stories that make the reader scroll through too many pages are not effective. Avoid making the reader scroll horizontally.

Format the page so the story can be printed properly, without text being cut off by margin settings. A common solution is to include a link to a 'print friendly version', usually another page with navigation menus and banners removed.

Write your text so the reader can get your point without having to force themselves to concentrate. Use structural features such as bulleted lists, introductory summaries and clear titles that can stand alone.

Don't use ALL CAPITAL LETTERS on the Internet. It looks like you're shouting. Underline only words that are electronic links. Use boldface rather than underlining for emphasis. Avoid italic typefaces because they are much harder to read.

Make sure your story is printed on a contrasting background colour: either light lettering on a dark background or the reverse. High contrast improves readability on the Internet. Make sure items are clearly dated so readers can determine if the story is current.

Graphs

A picture is indeed worth a thousand words, or a thousand data points. Graphs (or charts) can be extremely effective in expressing key results, or illustrating a presentation.

An effective graph has a clear, visual message, with an analytical heading. If a graph tries to do too much, it becomes a puzzle that requires too much work to decipher. In the worst case, it becomes just plain misleading.

Go the extra mile for your audience so that they can easily understand your point.

Good statistical graphics:
- Show the big picture by presenting many data points;
- Are "paragraphs" of data that convey one finding or a single concept;
- Highlight the data by avoiding extra information and distractions, sometimes called "non-data ink" and "chart-junk";
- Present logical visual patterns.

When creating graphics, let the data determine the type of graph. For example, use a line graph for data over time, or a bar graph for categorical data. To ensure you are not loading too many things into a graph, write a topic sentence for the graph.

Achieve clarity in your graphics by:

- Using solids rather than patterns for line styles and fills;

- Avoiding data point markers on line graphs;

- Using data values on a graph only if they don't interfere with the reader's ability to see the big picture;

- Starting the Y axis scale at zero;

- Using only one unit of measurement per graphic;

- Using two-dimensional designs for two-dimensional data;

- Making all text on the graph easy to understand;
  - Not using abbreviations;
  - Avoiding acronyms;
  - Writing labels from left to right;
  - Using proper grammar;
  - Avoiding legends except on maps.

For example:

Adoptions fall by 2.4% in 2003[3]

Adoption Orders in England and Wales

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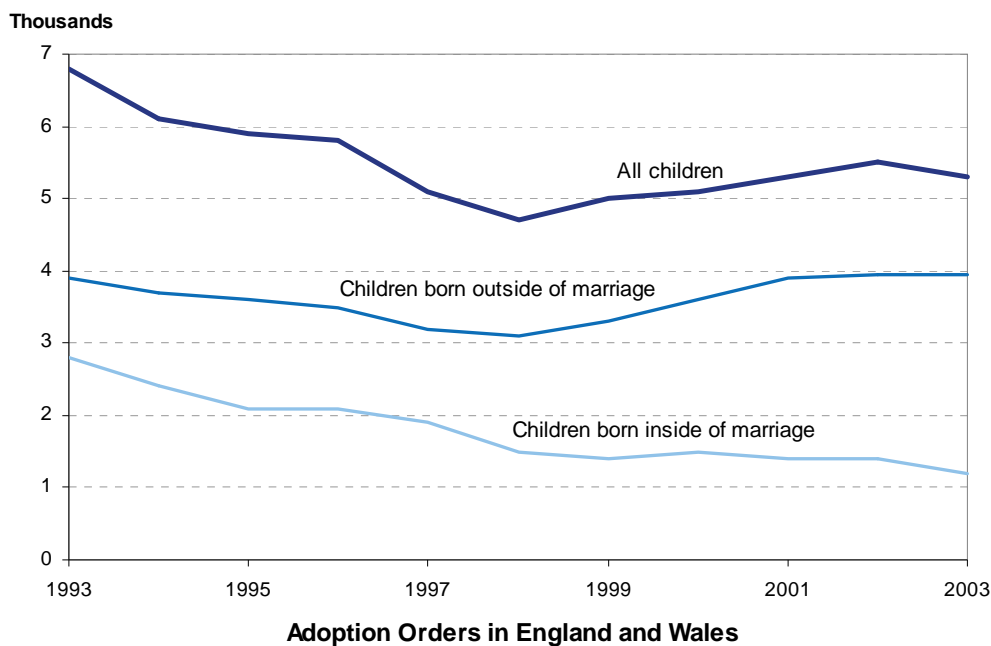
[3] Source: UK Office for National Statistics.

Tables

Good tables complement text. They should present numbers in a concise, well-organized fashion to support the analysis. Tables help minimize numbers in the statistical story. They also eliminate the need to discuss insignificant variables that are not essential to the story line.

Make it easy for readers to find and understand numbers in your table. Standard presentation tables are generally small. One decimal place will be adequate for most data. In specific cases, however, two or more decimal places may be required to illustrate subtle differences in a distribution.

Presentation tables rank data by order or other hierarchies to make the numbers easily digestible. They also show the figures that are highest and the lowest, as well as other outliers. Save large complex tables for supporting material.

Always right-justify the numbers to emphasize their architecture. The guidelines listed for graphics above, such as highlighting data by avoiding "non-data ink", also apply to the presentation of tables.

While graphics should be accompanied by an analytical heading, titles are preferred for tables. They should be short and describe the table's precise topic or message.

For example:

Race of Juvenile Offenders[4]

Race of juvenile offender(s)	Average annual percent of violent crimes committed by juvenile(s)
Total	**100.0%**
White	59.1
Black	25.2
Other	11.4
More than 1 racial group	2.6
Unknown	1.7

Maps

Maps can be used to illustrate differences or similarities across geographical areas. Local or regional patterns, which may be hidden within tables or charts, are often made clear by using a well designed map.

Maps are a rapidly expanding area of data presentation, with methods of geographic analysis and presentation becoming more accessible and easier to use. The cost of Geographic Information Systems (GIS), or software capable of mapping statistics, has decreased rapidly in the last ten years. Mapping that was once expensive, or required specialist hardware, is now within reach of most organizations. GIS analysis and presentation are now taught in schools and universities.

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[4] Source: Baum, K. (2005), "Juvenile Victimization and Offending, 1993-2003", in *Bureau of Justice Statistics, Special Report*, U.S. Department of Justice, Office of Justice Programs, available at http://www.ojp.usdoj.gov/bjs/pub/pdf/jvo03.pdf.

Producing statistical maps can be a simple process. The most common type of statistical map is the choropleth map, where different shades of a colour are used to show contrast between regions (usually a darker colour means a larger statistical value). This type of map is best used for ratio data (e.g. population density), where the denominator is usually area (e.g. square kilometres) or population. 'Count ' data which has no denominator (e.g. total number of sheep in each region), are best illustrated using proportional or graduated symbol maps. With proportional symbol maps, the size of a symbol, such as a circle, increases in proportion to the value of the statistic. All mapping software should be capable of producing these two map types. Other types of map are possible but are best retained for specialist audiences.

When designing a map, always think about the audience and try to make it quick and easy for them to understand. If there is a natural association between a colour and a topic (e.g. blue for cold temperatures) then it would be sensible to use that colour for the legend. When choosing your legend classes, do not use complex methods unless your audience will understand them. Choosing classes of equal size, or classes containing similar numbers of events, are the most common methods. When choosing how many coloured classes to use, less is often more. Fewer classes emphasize similarity between areas and more classes emphasize the differences.

It should be possible for any statistical map to be read by a user without reference to other information and knowledge. Maps should always have a title and a legend that adequately explain the statistical units, the date that the statistical information was collected or produced and the geographic area type used. The source of statistical data should also be clearly stated. Footnotes may be used to clarify this information where needed and help to simplify titles.
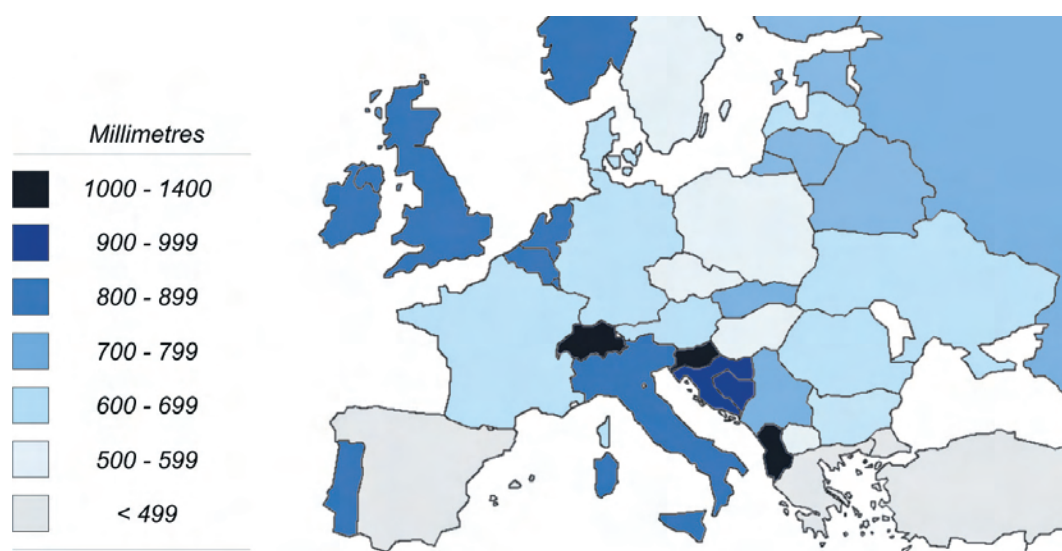
Average Annual Rainfall 1961 - 1990, Europe[5]

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[5] Source: United Nations Economic Commission for Europe (UNECE).

How to encourage good writing

Each statistical agency may have its own ideas on ways to reward quality writing. But here are some general suggestions.

- Set goals, such as a number of stories to be written each year;

- Reward good writers for the best headline, most contributions, etc;

- Make writing an expected part of the job rather than a sideline;

- Explore techniques for building enthusiasm for writing;

- Show staff the results of their writing: Post newspaper or magazine coverage initiated by their stories on an office bulletin board;

- Provide training.

5. Writing about data: Make the numbers "stick"

Numbers don't "talk". But they should communicate a message, effectively and clearly. How well they do this depends a lot on how well authors use numbers in their text.

In a sense, journalists and statisticians are from two cultures. They tend not to talk the same language. Journalists communicate with words; statisticians communicate with numbers.

Journalists are often uncomfortable when it comes to numbers. Many are unable even to calculate a percentage increase. So here are some suggestions for making the data "stick":

Don't peel the onion. Get to the point:

Poor: "The largest contributor to the monthly increase in the CPI was a 0.5% rise in the transportation index."

Better: "Higher auto insurance premiums and air fares helped push up consumer prices this month."

Avoid proportions in brackets:

Poor: "Working seniors were also somewhat more likely than younger people to report unpaid family work in 2004 (12% versus 4%)."

Better: "About 12% of working seniors reported unpaid family work in 2004, compared with 4% for younger people."

Watch percentage changes vs. proportions: A percentage change and a percentage point change are two different things. When you subtract numbers expressed as proportions, the result is a percentage point difference, not a percentage change.

Wrong: "The proportion of seniors who were in the labour force rose 5% from 15% in 2003 to 20% in 2004."

Right: "The proportion of seniors who were in the labour force rose five percentage points from 15% in 2003 to 20% in 2004."

Avoid changing denominators:

Confusing: "Two out of every five Canadians reported that they provided care for a senior in 2001, compared with one in seven in 1996, according to the census."

Clearer: "About 40% of Canadians reported that they provided care for a senior in 2001, up from 14% in 1996, according to the census."

Reduce big numbers to understandable levels:

<u>Cumbersome:</u>	"Of the $246.8 billion in retail spending last year consumers spent $86.4 billion on cars and parts, and $59.3 billion on food and beverages."
<u>Easy to grasp:</u>	"Of every $100 spent in retail stores last year, consumers spent $31 on cars and parts, compared with only $23 on food and beverages."

What's wrong with this article?

A NEW REPORT RELEASED TODAY SAYS THAT THE PRICES OF MANY PETROLEUM PRODUCTS WILL BE HIGHER IN THE FUTURE

The tight global markets and elevated crude oil prices are expected to result in higher **prices for petroleum products**. The cost of imported crude oil to refineries this winter is projected to average 98.3 c/g (about $40 per bbl) compared to 70.1 c/g last year. During the winter, WTI prices are expected to decline from their current record levels but remain in the $40 per bbl range, but despite above-average natural gas stocks, average winter natural gas prices, both at the wellhead and retail levels, are expected to be above those of last winter, particularly during the fourth quarter of 2004, in response to the hurricane-induced production losses in the Gulf of Mexico during September.

Increases in heating fuel prices are likely to generate higher expenditures even in regions where demand for fuel is expected to fall. Average residential natural gas prices this winter are expected to be 10 percent higher year-over-year and household expenditures are expected to be 15 percent higher.

Therefore, residential space-heating expenditures are projected to increase for all fuel types compared to year-ago levels.

Demand is expected to be up by 1.637 percent. This increase reflects greater heating degree days in key regions with larger concentrations of gas-heated homes and continued demand increases in the commercial and electric power sectors. Due to the availability of primary inventories, many petroleum products are expected to be reasonably well protected against the impact of demand surges under most circumstances. As of October 1, working natural gas inventories were estimated to be 3.6tcf, up 2 percent from three years ago, 3 percent from two years ago and 1 percent from last year.

Other interesting findings from this report are that the spot price for crude oil continues to fluctuate. Prices continue to remain high even thought OPEC crude oil production reached it's highest levels in September since OPEC quotas were established in 1982. Overall inventories are expected to be in the normal range, petroleum demand growth is projected to slow, and natural gas prices will be will increase.

- ✖ Headline is too long and doesn't make a clear point.
- ✖ All-cap headline looks like the author is shouting.
- ✖ Don't underline words unless they are an electronic link.
- ✖ Lead paragraph is background.
- ✖ Report title and release date aren't stated.
- ✖ Jargon: Readers might not know that gasoline and heating oil are petroleum products.
- ✖ Spell out units: c/g is cents per gallon; bbl is barrel.
- ✖ Acronyms: OPEC is the Organization of Petroleum Exporting Counties.
- ✖ First paragraph is too long: Too much detail, too many numbers.
- ✖ Sentences are too long.
- ✖ The main story line is in the third paragraph.
- ✖ Unexplained references: demand for what is expected to be up?
- ✖ Round numbers: not 1.637 percent.
- ✖ Elevator economics: this is up, this is down.
- ✖ Bullets preferable in the last paragraph.
- ✖ No URL link cited at the end.
- ✖ No contact or phone number provided.
- ✖ Proof read! In the last paragraph, "thought" should be "though"; "it's" should be its" and "will be will increase" should read "to increase".

A revised version

Released: September 16, 2004

Consumers will spend more to heat their homes this winter

Homeowners will pay much more this winter to heat their homes, according to the latest Heating Usage report released today by the Energy Minister. It predicts an 8% increase in spending over last winter.

Increases in prices for heating fuel are likely to generate higher spending, even in regions where demand for fuel is expected to fall. Average residential prices for natural gas are expected to be 10% higher than last winter, while household spending is expected to rise by 15%.

Tight global markets and elevated crude oil prices are expected to result in higher prices for petroleum products. The cost of imported crude oil to refineries this winter is projected to average 98 cents per gallon (about $40 dollars per barrel), compared with 70 cents per gallon last year.

Despite above-average stocks of natural gas, average winter natural gas prices, both at the wellhead and retail levels, are expected to be above those of last winter.

Other interesting findings from this report:

- The spot price for crude oil continues to fluctuate. Prices continue to remain high even though the Organization of Petroleum Exporting Countries (OPEC) production of crude oil reached its highest levels in September since OPEC was established in 1982.

- Overall petroleum inventories are expected to be in the normal range.

See the entire report at www.HeatingUsage.gov. Contact John Smith in the Press Office at 123.4567 for more information.

6. Evaluating the impact

Media analysis

It is a good idea for statistical agencies to monitor the impact of their statistical stories in the print and electronic media from the point of view of both the number of "hits" and the quality of coverage.

Useful resources for gauging the breadth, balance and effectiveness of media coverage include Google News, LexisNexis, blogs, and electronic and paper subscriptions.

Monitoring coverage can help managers determine if more work is needed to educate journalists, statisticians or key stakeholders about better ways of conveying the meaning of numbers in language that laypeople can understand. Monitoring would include:

- Keyword searches to measure extent of media coverage;
- Total coverage for a pre-determined period of time;
- Daily coverage to identify spikes;
- Comparing coverage to established baselines;
- Prior releases of the same data product;
- Qualitative methods to analyse media coverage;
- Correct interpretation of the numbers;
- Coverage of target audiences;
- Inclusion of key story-line messages;
- Inclusion of core corporate messages;
- Effective use of illustrative embedded graphics;
- Tone of story (positive/negative);
- Tone of quotes from external spokespersons (positive/negative).

Website analysis

Monitoring Internet traffic with website usage software can help determine types of stories most in demand. You should look for:

- The number of page views, visits, etc., to specific pages;
- Where visitors are coming from;
- Where visitors are going when they leave your pages.

In addition, surveys of users of your site – both media and general users – can help target and improve the information available. You should:

- Ask the customer if they found what they were looking for when they came to the site;

- Target specific questions to known users of the site;

- Ask how the site is used and how often;

- Assess general satisfaction with the site;

- Solicit recommendations for change or additional topics;

- Use focus groups with media representatives to explore needs, approaches and reactions.

7. Before and after: Applying good writing techniques

To illustrate how to turn a routine statistical story into one with a much stronger story-line and more effective use of data, here is a 'before' and 'after' example. Note the differences.

BEFORE

Divorces
2003

In 2003, 70,828 couples divorced, up a slight 1.0% from the recent low of 70,155 in 2002.

The number of divorces has remained relatively stable over the last few years. The year-to-year change has been below two percent for every year since 1999.

The increase in the number of divorces between 2002 and 2003 kept pace with the increase in the Canadian population over this period. As a result, the crude divorce rate for 2003 remained the same as in 2002, at 223.7 divorces for every 100,000 people in the population.

The 1.0% increase in the number of divorces across Canada is primarily due to a 5.1% increase in the number of divorces in Ontario and a 1.4% increase in Quebec between 2002 and 2003. Prince Edward Island and Saskatchewan were the only other provinces to experience an increase in the number of divorces between these years. Newfoundland and Labrador showed the largest percentage decrease by far in the number of divorces, down 21.4%.

Repeat divorces, involving people who had been divorced at least once before, are accounting for an increasing proportion of divorces.

In 1973, only 5.4% of divorces involved husbands who had previously been divorced. Thirty years later this proportion has tripled to 16.2% of all divorces.

The proportion of divorces involving wives who had previously been divorced is similar, rising from 5.4% to 15.7% over this thirty year period.

Marriage stability can be assessed using divorce rates based on years of marriage. The proportion of marriages expected to end in divorce by the 30th wedding anniversary inched up to 38.3% in 2003, from 37.6% in 2002.

The divorce rate varies greatly depending on how long couples have been married, rising rapidly in the first few years of marriage. The peak divorce rate in 2003 occurred after three years of marriage, when 26.2 out of 1,000 marriages ended in divorce. The risk of divorce decreased slowly for each additional year of marriage.

The custody of dependents, the vast majority of whom are children aged 18 and under, was granted through divorce court proceedings in 27% of 2003 divorces

In the remaining divorces, couples arrived at custody arrangements outside the divorce proceedings, or they did not have dependents. The number of dependents in these divorces is not available.

There has been a 17-year trend of steady increases in joint custody arrangements. Of the 33,000 dependents for whom custody was determined through divorce proceedings in 2003, 43.8% were awarded to the husband and wife jointly, up 2.0% from 2002. Under a joint custody arrangement, dependents do not necessarily spend equal amounts of their time with each parent.

The custody of 47.7% of dependents was awarded to the wife and 8.3% to the husband in 2003. In 2002, these percentages were 49.5% and 8.5%, respectively.

The shelf tables Divorces, 2003 (84F0213XPB, $22) are now available.

For general information or to order custom tabulations, contact Client Custom Services (613-951-1746; hd-ds@statcan.ca). To enquire about the concepts, methods or data quality of this release, contact Brent Day (613-951-4280; brent.day@statcan.ca) or Patricia Tully (613-951-1759; patricia.tully@statcan.ca), Health Statistics Division.

AFTER

Divorces – 2003

Repeat divorces, those involving people who had been divorced at least once before, are accounting for an increasing proportion of divorces in Canada, according to new data.

In 1973, only 5.4% of divorces involved husbands who had previously been divorced. Some 30 years later, this proportion has tripled to 16.2% of all divorces. Similarly, the proportion of divorces involving wives who had previously been divorced rose from 5.4% to 15.7% during this three-decade period.

The number of couples getting a divorce in 2003 edged up 1.0% from a year earlier to 70,828. This slight increase was due primarily to a 5.1% jump in divorces in Ontario, and a 1.4% increase in Quebec. Prince Edward Island and Saskatchewan were the only other provinces to experience an advance.

The number of divorces fell 21.4% in Newfoundland and Labrador, by far the largest decline. No information on the reason for this decrease is available.

The number of divorces has remained relatively stable over the last few years. The year-to-year change has been below 2% since 1999. The slight rise in divorces in 2003 kept pace with the increase in the Canadian population.

Divorces			
	2002	**2003**	**2002 to 2003**
	number		% change
Canada	**70,155**	**70,828**	**1.0**
Newfoundland and Labrador	842	662	-21.4
Prince Edward Island	258	281	8.9
Nova Scotia	1,990	1,907	-4.2
New Brunswick	1,461	1,450	-0.8
Quebec	16,499	16,738	1.4
Ontario	26,170	27,513	5.1
Manitoba	2,396	2,352	-1.8
Saskatchewan	1,959	1,992	1.7
Alberta	8,291	7,960	-4.0
British Columbia	10,125	9,820	-3.0
Yukon	90	87	-3.3
Northwest Territories	68	62	-8.8
Nunavut	6	4	-33.3

Total divorce rate, by the 30th wedding anniversary			
	2002	**2003**	**2002 to 2003**
	per 100 marriages		increase/decrease
Canada	**37.6**	**38.3**	**0.7**
Newfoundland and Labrador	21.8	17.1	-4.7
Prince Edward Island	25.2	27.3	2.1
Nova Scotia	30.4	28.9	-1.5
New Brunswick	27.2	27.6	0.4
Quebec	47.6	49.7	2.1
Ontario	34.9	37.0	2.1
Manitoba	30.3	30.2	-0.1
Saskatchewan	28.7	29.0	0.3
Alberta	41.9	40.0	-1.9
British Columbia	41.0	39.8	-1.2
Yukon	43.4	40.0	-3.4
Northwest Territories and Nunavut[1]	31.2	27.6	-3.6

1. Northwest Territories and Nunavut are combined to calculate the rates in this table because marriage and divorce data are not available for these territories separately for the 30-year period required for the calculation of the total divorce rate.

As a result, the crude divorce rate for 2003 remained stable at 223.7 divorces for every 100,000 people in the population.

Marriage stability can be assessed using divorce rates based on years of marriage. The proportion of marriages expected to end in divorce by the 30th wedding anniversary inched up to 38.3% in 2003, from 37.6% in 2002.

The divorce rate varies greatly depending on how long couples have been married. It rises rapidly in the first few years of marriage. The peak divorce rate in 2003 occurred after three years of marriage, when 26.2 out of 1,000 marriages ended in divorce.

The risk of divorce decreased slowly for each additional year of marriage.

The custody of dependents, the vast majority of whom are children aged 18 and under, was granted through divorce court proceedings in 27% of 2003 divorces.

8. Examples of well-written statistical stories

There are many sources of well-written stories and this guide can only touch on some. You can find more examples on the Internet, in newspapers and in statistical publications. Here are a few areas to start looking:

- Statistics Norway publishes their Statistical Magazine online. It features a wide range of topics and shows examples of clear tables and graphics.
  http://www.ssb.no/english/magazine/

- The United States Bureau of Justice Statistics website links to their online publications and press releases.
  http://www.ojp.usdoj.gov/bjs/

- The United Kingdom's Office of National Statistics has a 'Virtual Bookshelf' that provides quick access to their online press releases, papers and publications, sorted by theme.
  http://www.statistics.gov.uk/onlineproducts/

- Statistics Netherlands regularly publishes short articles on the Internet as part of their 'Webmagazine' series. The articles show how to incorporate graphics to make the message clear.
  http://www.cbs.nl/en-GB/menu/publicaties/webpublicaties/webmagazine/

- Statistics Canada has a section on their website called 'The Daily'. Here you will find many examples of brief articles and press releases.
  http://www.statcan.ca/english/dai-quo/

- Look at websites of other statistical agencies. A good starting point is the UNECE's list of links to national and international agencies.
  http://www.unece.org/stats/links.htm

9. Further reading

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United Nations Economic Commission for Europe (2004), *Communicating with the Media: A guide for statistical organizations*, Geneva, United Nations.

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Making Data Meaningful
A guide to writing stories about numbers

On their own, statistics are just numbers. They are everywhere in our life. Numbers appear in sports stories, reports on the economy, stock market updates, to name only a handful. To mean anything, their value to the person in the street must be brought to life.

This guide is designed as a practical tool to help managers, statisticians and media relations officers bring statistics to life using effective writing techniques. It contains suggestions for using text, tables, graphics and other information to make data meaningful.

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

Making Data Meaningful

Part 2:
A guide to presenting statistics

UNITED NATIONS
Geneva, 2009

NOTE

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontier or boundaries.

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Introduction

The *Making Data Meaningful* guides have been prepared within the framework of the United Nations Economic Commission for Europe (UNECE) Work Sessions on the Communication and Dissemination of Statistics[1], under the programme of work of the Conference of European Statisticians[2].

These guides are intended as a practical tool to help managers, statisticians and media relations officers in statistical organizations, particularly those organizations that are in the process of developing their communication strategies. The guides provide advice on the use of text, tables, charts, maps and other devices to bring statistics to life for non-statisticians. They contain suggestions, guidelines and examples - but not strict rules or rigid templates.

An effective data release uses a combination of text, tables and graphics to maximize its strength in conveying various types of information. *Making Data Meaningful Part 1: A guide to writing stories about numbers* (issued in 2006) focused on the use of effective writing techniques. *Making Data Meaningful Part 2: A guide to presenting statistics* aims to help readers find the best way to get their message across to non-specialists, using the most suitable set of tools and skills now available from a dazzling array of communication methods.

This guide recognizes that there are many practical and cultural differences among statistical organizations and that approaches may vary from country to country.

A group of experts in the communication and dissemination of statistics prepared this guide. They are (in alphabetical order):

- Petteri Baer, UNECE
- Colleen Blessing, United States Energy Information Administration
- Eileen Capponi, Organisation for Economic Co-operation and Development
- Jerôme Cukier, Organisation for Economic Co-operation and Development
- Kerrie Duff, Australian Bureau of Statistics
- John Flanders, Statistics Canada
- Colleen Flannery, United States Census Bureau
- Jessica Gardner, UNECE
- Martine Grenier, Statistics Canada
- Armin Grossenbacher, Swiss Federal Statistical Office
- David Marder, United Kingdom Office for National Statistics
- Kenneth Meyer, United States Census Bureau
- Terri Mitton, Organisation for Economic Co-operation and Development
- Eric St. John, Statistics Canada
- Thomas Schulz, Swiss Federal Statistical Office
- Anne-Christine Wanders, UNECE

The contributions of Martin Lachance (Statistics Canada), Andrew Mair (Australian Bureau of Statistics), Alan Smith (United Kingdom Office for National Statistics), Christina O'Shaughnessy and Steven Vale (UNECE) are greatly appreciated.

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[1] Information about the UNECE Work Sessions on the Communication and Dissemination of Statistics are available from the UNECE website at http://www.unece.org/stats/archive/04.05.e.htm.
[2] Information about the Conference of European Statisticians is available from the UNECE website at http://www.unece.org/stats/archive/act.00.e.htm.

1. Getting the message across

1.1   The written word

News releases are often the vehicle through which your statistical organization communicates key findings of its statistical and analytical programmes to the intended audience, which is most probably the general public. The text is the principal vehicle for explaining the findings, outlining trends and providing contextual information.

In this chapter, we will provide many suggestions for preparing an "effective" news release or other document, such as a report or an analytical article.

What makes a news release, report or analytical article effective? Perhaps the best explanation comes from the first *Making Data Meaningful* guide, *Part 1: A guide to writing stories about numbers*, which provides an initial set of recommendations for getting your message across. An effective news release is one that:

- tells a story about the data;

- has relevance for the public and answers the question "Why should my audience want to read about this?";

- catches the reader's attention quickly with a headline or image;

- is easily understood, interesting and often entertaining;

- encourages others, including the media, to use statistics appropriately to add impact to what they are communicating.

Here are some tips to help you get started on your text.

1.2   Target audience: your first decision

The first important decision you must make is to pinpoint an audience: who are you writing for? Quite simply, the audience is in the driver's seat. By and large, what the audience wants is what you should be giving them. You have to listen to your audiences to find and select the right narratives, language, and visual and graphic devices that will capture their attention.

The choice of an audience is more complex these days because of the Internet. Most statistical organizations have a mandate to communicate to the general public, who are non-specialized, fairly well-educated laypeople. In the days of printed news releases, the principal target audience was likely to be the media, on which organizations relied to transmit key findings to the public.

Nowadays, however, statistical organizations have developed a significant direct readership through their websites, e-mail and other forms of Internet-based distribution. This means that they are communicating with a host of audiences simultaneously: the public, data users, bankers, financial analysts, university professors, students and so on, each with their own data requirements.

The communications world is constantly evolving. Successful commercial media know this and constantly monitor - often in real time - which of their stories get the most attention. They then target their resources to create richer content by using devices such as video, additional photos or more analysis to encourage greater interaction with each audience.

In any case, the message here is that before throwing precious resources into any method of communication - new or established - it is important to decide first who your audiences or stakeholders are, what it is they want from you and how they want it.

Should you wish to address several audiences, you must select the most appropriate method to reach each of them, by transmitting your message through appropriate channels and using appropriate communication techniques.

Often though, lack of time and resources mean that it is not possible to reach all of your audiences all of the time. You have a choice: you can prioritize or, if you want to reach the widest audience, you can find the clearest common ground.

This is what many statistical organizations do. They target the general public, but make a concerted effort to reach this audience by using journalists as a kind of 'conduit'. The intended audience is the public, but journalists are the means of communicating with that audience. Experts and specialists also benefit from this approach. Often, the simple clear techniques used to reach a wide audience are warmly welcomed by even the most specialized audience.

1.3   Understand the context in which you are communicating

Statistical communication does not occur in isolation. Therefore, it is important that you understand the context in which you are communicating. The way in which audiences consume media is constantly changing. There are also distinct differences between generations, in their technical abilities and understanding of statistics.

When planning statistical communication, you should keep in mind four particular trends in online media consumption, which represent both opportunities and risks:

1. The World Wide Web is increasingly becoming a medium for entertainment. Any message that is not presented in an interesting way risks not engaging with younger audiences.

2. Society has developed a "snack culture" in relation to information consumption. Audiences increasingly want smaller snippets of information that can be consumed quickly.

3. Audiences using the Internet tend to "satisfice": they find a vaguely relevant piece of information and stop there, rather than look further for the most relevant piece of information.

4. In addressing different audiences and presentation styles, try not to exclude important audiences in the process of making your statistical communication more entertaining or easier to consume.

So what can you do to make the best use of the Internet? You must use the most appropriate tools of language, structure and presentation to get your message across. The following sections will illustrate how.

1.4 Narrative: telling the story

First and foremost, find a story

For data to be meaningful to a general audience, it is important to find meaning in the numbers. The word "story" often alarms people in the statistical/scientific world, because it has overtones of fiction or embellishment that might lead to misinterpretation of the data. This view might be justified if analysts do not approach the data with care and respect.

However, the alternative, i.e. avoiding a story, may be far worse. People often distrust statistics and feel they are misleading, because they cannot understand the data. This occurs because we, the people who produce data, fail to make them relevant and explain them in terms that people can understand. Without a story line, a release becomes just a simple description of numbers.

A statistical story must be based on sufficient knowledge of the data and the phenomenon under study. Otherwise, it may be interesting, but in fact all wrong. When preparing a statistical story, you must also remember the Fundamental Principles of Official Statistics[3]:

1. Impartiality;
2. Professionalism;
3. Metadata;
4. Comment on erroneous interpretation;
5. Diverse sources;
6. Confidentiality;
7. Transparency;
8. National coordination;
9. International standards;
10. International cooperation.

It is vital that statistical organizations remain impartial and ensure the confidentiality of respondents and small sub-populations.

Your text should place the most important and significant findings in the context of short- and longer-term trends. It should explore relationships, causes and effects, to the extent that they can be supported by evidence. It should show readers the significance of the most current information.

Write in journalistic style

Use the writing style adopted by journalists: the "inverted pyramid". Present the most important facts first, followed by subsidiary points in decreasing order of importance. Readers lose interest quickly, so the most critical information must be at the beginning of the text.

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[3] These principles were adopted by the United Nations Statistical Commission in 1994. They are described in detail on the UNECE website at http://www.unece.org/stats/archive/docs.fp.e.htm.

Avoid starting your text with methodology and ending it with a conclusion. You can put key points regarding methodology in a note to readers - the less complex the explanation of methodology, the better. The conclusion should become your lead or opening paragraph.

The lead is the most important element of your text. It should tell a story about the data. It summarizes the story line concisely, clearly and simply, and sets the story in context. It should concentrate on one message or theme and contain a minimum of data.

<div align="center"><strong style="color:green">GOOD EXAMPLE of a lead paragraph:</div>

> Net profits of non-financial companies in the Netherlands amounted to 19 billion euros in the second quarter of 2008. This is the lowest level for three years. Profits were 11 percent lower than in the second quarter of 2007. The drop in net profits is the result of two main factors: higher interest costs - the companies paid more net interest - and lower profits of foreign subsidiaries.
>
> Source: Statistics Netherlands

Do not burden the reader with too many numbers in the body of the text and use only key rounded figures. Less important numbers should be relegated to accompanying tables. Use the text to present analysis, trends and context, not to repeat values in the tables.

Pay attention to structure

Structure your text so that each component makes sense on its own and also contributes to the overall story you are telling. Subheadings are an effective tool for strengthening the organization of a release. They break it into manageable and meaningful sections.

A concise subheading summarizes the main finding in the subsection. It may be more engaging and understandable when it contains a verb.

<div align="center"><strong style="color:green">GOOD EXAMPLES of subheadings:</div>

> "Inventory levels ease slightly"
>
> "Growth in energy products leads the rise in imports"

For Internet-based communications, each subsection should make sense on its own, which means that terms should be spelled out and sources should be noted. Search engines tend to drive users to deep links within websites, rather than to the home page or other gateways you have created to channel visitors to their desired destinations.

Your messages should also be layered so they cater to the different information needs of your audiences. Start each subsection with a topic sentence that states clearly the main finding in the subsection. You can elaborate on this finding in subsequent paragraphs.

This structure will provide a clear pathway into more detailed data, analysis and technical information for audiences that are interested in such detail. Also, in electronic publications, you can always use links to take your readers to more complex analysis.

1.5   Language: keep it clear, concise and simple

Simple language is at the heart of any successful communication. The old adage "keep it short and simple" (KISS) is as true now as it has ever been. This does not apply just to your text. It is also relevant for tables, visuals and graphics where, with so many opportunities to be clever, the temptation is to be too elaborate.

Strive for plain language. Too often, we accept material written in an "official" style that is inefficient and often unfriendly or unclear.

Using plain language is not patronizing, trivializing or over-simplifying. Nor does it mean letting grammar slip. Plain language conveys a clear and concise message. It is used with the reader in mind and with the right tone of voice.

Plain language is faster to read and gets your message across more often, more easily and in a friendlier way.

Remember: clear and simple messages are **NOT** the same as "dumbing down".

Some tips for clear writing:

- Use short sentences;
- Aim for one idea per sentence;
- Break up long sentences;
- Start each paragraph with the most important message;
- Keep paragraphs short;
- Keep your writing crisp.

In the case of verbs, avoid the passive voice; use the active voice. Passive verbs can be confusing and make writing long-winded and less direct.

BAD EXAMPLE:

"The unemployment rate increase was caused by the economic crisis."

GOOD EXAMPLE:

"The economic crisis caused the unemployment rate to rise."

Avoid jargon wherever possible. Jargon is language that has specific meaning to a certain group of people. It is almost always unsuitable for a wider audience. Use the simplest words that fit your message and that your reader will understand. However, if your audience consists entirely of specialists in a particular field, jargon might be the most appropriate language to use.

1.6   Evaluating the impact: media analysis

Did your audience make correct and intelligent interpretations of your data? Could they use the analysis to make sound economic, environmental and social judgments and policies?

You won't know unless you analyze what your audience did with your data release. It is a good idea for statistical organizations to monitor how both the media and other audiences use their information. Some methods include:

- Establish a "Voice of the Customer Programme" or some other customer feedback-gathering process;

- Gauge public reaction through user-groups and focus-groups consisting of your key stakeholders;

- Conduct user surveys or consult influential clients on a one-to-one basis;

- Employ market research services if you need in-depth understanding of a sensitive issue or an audience that is difficult to access;

- Monitor Internet traffic to help determine which data and stories are most in demand from audiences;

- Analyse search keyword patterns and terms for a powerful, yet simple, technique for understanding what information your audience is seeking.

You can work directly with the media to ensure messages are reported accurately and fairly. The media are the simplest, cheapest and most effective way of getting your statistical messages to a wide audience.

Unfortunately, some media have their own agenda, which can result in misuse, misinterpretation and misunderstanding of your data. It is vital to monitor the reach of your messages through the media, as well as the tone and quality of the coverage. In the case of any clear misuse, you should respond rapidly, consistently and firmly.

Now that we have covered the key elements of the text, let us turn our attention to visual elements that help us explain the data better.

2. Visualization of statistics

2.1 Why a picture is still worth a thousand words

We have all heard the old adage: "a picture is worth a thousand words". One of the best techniques for understanding data is to visualize the numbers as a picture. This can make it far easier to see a pattern or it can expose patterns that might otherwise have been concealed.

You can visualize data in many different ways, from simple bar charts to more complex scatterplots, thematic maps and animated population pyramids. There is also no shortage of technical help: books have been written on visualizing data; there are scores of websites devoted to the subject; and there is a wide range of software and downloadable programs available for every purpose.

This chapter provides a brief historical look at data visualization and guidelines for developing good data visualizations.

2.2 Visualization is an integral part of statistical business processes

You should make the effective presentation of data an integral part of your statistical production process. As data visualization is such an important part of communicating statistical trends and relationships, it must be an on-going activity, not an afterthought. Visualization is included in the "disseminate" phase of the Generic Statistical Business Process Model[4], being developed by the UNECE/Eurostat/OECD Steering Group on Statistical Metadata.

Readers can easily understand visual presentations. Charts and maps have an impact on nearly everybody through newspapers, television, the Internet and books. It is much easier to understand statistics presented as a chart or a map, rather than long lists of numbers - assuming, of course, that the visual presentations are produced correctly.

The presentations should illustrate trends and relationships quickly and easily. They are an efficient way of getting information out of a database and into the reader's head.

But take care. Poor visualizations of statistical information can be misleading. There are many ways to provide misleading information, whether deliberately or, as is more often the case, unintentionally. There must be a balance between design and function. Complicated visualizations often fail to communicate. As interpreting charts can be demanding, don't force your readers to have to "dig out" the message.

Misunderstandings and misinterpretations also can result from different cultural traditions. Colours, for example, may have different symbolic meanings in different parts of the world.

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[4] http://www1.unece.org/stat/platform/display/metis/The+Generic+Statistical+Business+Process+Model

2.3   A Scot's historical influence on data visualization

The history of statistical charts, as we understand them today, is less than 300 years old. Even though ancient Romans and Arabs were good at using numbers, they did not use bar charts or curves to present figures visually.

René Descartes (1596-1650), the French encyclopedist and philosopher, was the first to use a rectangular coordinate system to visualize his observations. But it was an engineer and economist from Scotland, William Playfair (1759-1823), who was the first to produce graphic presentations of statistical data in ways that are familiar today.

Playfair published two books on the development of world trade at the turn of the 19th century (1786 and 1801), in which he used what he called the "graphic method". He was a keen marketer of this new approach, advocating the advantages of visual presentations with the following arguments:

1. Graphical presentations help to simplify complicated relations that may be difficult to observe:

    "It is hoped that, with the assistance of these charts, information will be got, without the fatigue and trouble of studying the particulars of which it is composed."

2. Business owners, politicians and decision-makers need a visual shortcut to the essence of statistical information, because they do not have the time to study the detail:

    "Men of great rank, or active business, can only pay attention to general outlines [...]."

3. Tables, especially voluminous tables, can be boring and difficult to perceive. Graphical presentations help the user:

    "[...] as much information may be obtained in five minutes as would require whole days to imprint on the memory, in a lasting manner, by a table of figures."

4. Graphics attract the eye. Playfair emphasized this in underlining the usefulness of his method for understanding relations and quantities.

5. The graphic method attracts and challenges the mind, assisting in not only perception but also in understanding structures and relations.

Although there has been a revolution in methods of visualization since Playfair's time, there is still room for refinements and new developments (see chapter 6). However, it is important to avoid presentations that are too flashy and that distort the observed content. **Remember that technology is merely a servant.** You should not add useless notes and obscure elements just because you can. Keep the message simple for the reader.

New masters at promoting a better understanding of graphic presentations and human perceptions today include Jacques Bertin, William Cleveland, Jan-Erik Kristiansen, Vesa Kuusela, Hans Rosling, Edward Tufte and Howard Wainer. Notwithstanding the work of these more recent specialists, the fundamentals of statistical graphics continue to be built on the innovations of William Playfair.

2.4   Basic facts about human perception

Our capacity to make visual observations rapidly and easily is based on the brain's ability to perceive regularities and irregularities. Much of this ability works unconsciously. The comparison is done almost before we start to think about it.

Look at the figure below. Which end of the horizontal bar in the centre is darker?
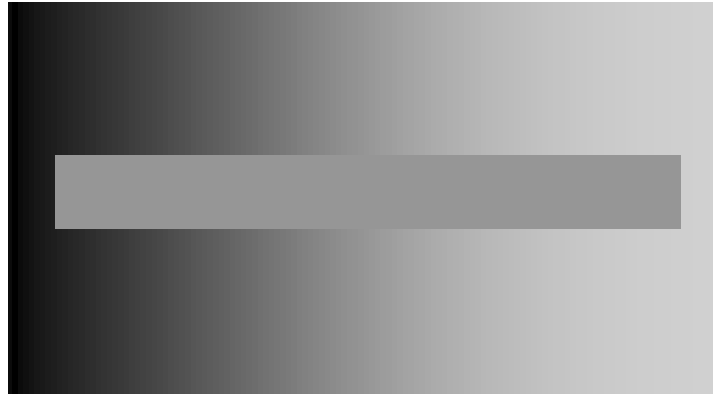
Source: Helmholtz, H. (1821-1894), "Simultaneous Contrast Illusion", In *Wikipedia, The Free Encyclopedia*, retrieved in July 2009 from http://en.wikipedia.org/wiki/Optical_illusion.

The bar is the same shade at both ends. The differences in the background produce the misperception. Cover the background with a piece of paper and you will easily notice this.

Now, consider these two images. Which circle is larger, the one in the centre of the diagram on the left or the one in the centre of the diagram on the right?
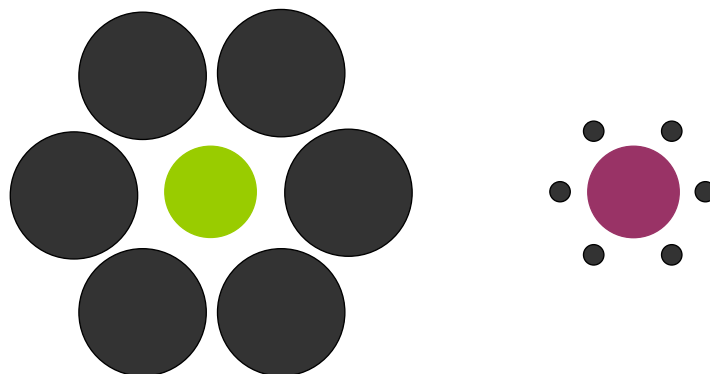
Source: Ebbinghaus, H. (1850-1909), "The Ebbinghaus Illusion", In *Wikipedia, The Free Encyclopedia*, retrieved in July 2009 from http://en.wikipedia.org/wiki/Hermann_Ebbinghaus.

The circles in the centre of each diagram are the same size. If you do not believe this, measure them!

These two examples illustrate how the human mind automatically sees objects in the context of their surroundings. It is the contrast with the surrounding matter that leads you to draw conclusions about the shade of the bar and the size of the two circles. Eliminate the surroundings and you are more likely to come to the correct conclusion.

The message for statisticians is this: you have to be careful when producing visual presentations of statistical observations. The context in which findings are presented may distort the user's perception.

Let us look at a third example. The graphic below is intended to convey the growth of car exports in Indochina, Morocco, Tunisia and Algeria from 1927 to 1929. How well do the sizes of the male figures reflect the real change in the data?
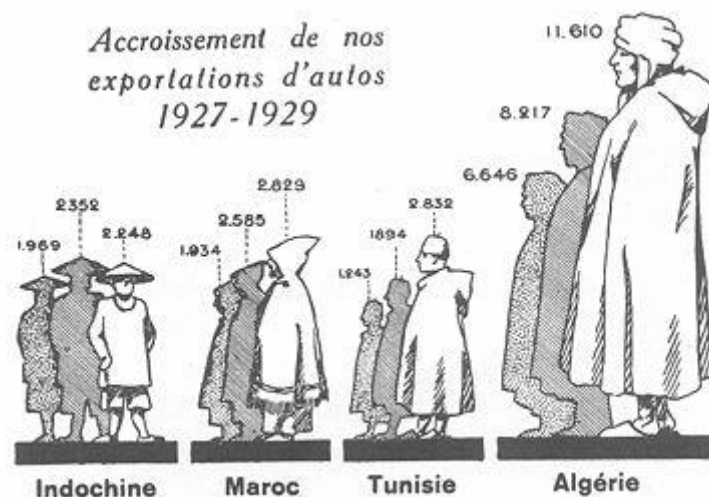
Source: Satet, R. (1932), *Les Graphiques*, Paris. Quoted in Tufte (2001).

In observing a picture, our mind compares the relative size of each object. In this graphic, the data on car exports between 1927 and 1929 are illustrated by the height and volume of the four sets of drawings. The relative values are misrepresented in two ways:

1. The scale is not accurate. The height of the figures for Algeria should be much greater. Something four times larger should be shown four times bigger or four times higher.

2. By overlaying the figure for the most recent year against the earlier years, the difference in values between the years is more difficult to calculate. The figure in the foreground appears much larger than those in the background. It is only their relative height that should be indicating the change between the years.

2.5   Perception is also based on experience

Experience also plays a role in how graphics are perceived. Know your audience and their abilities, experiences and possible differences. Do not assume that they know what you know, either about statistics or about the subject matter.

Statisticians must be aware of their own experience in identifying patterns in numbers, as opposed to the possible inexperience of their readers. As professionals in analysing statistical figures, statisticians are likely to be better than the average person at seeing the underlying message. Statisticians use visualizations to explain their findings, because wider audiences need more help to perceive the statistical information. A visual presentation of data should make the main findings easy to observe and understand.

2.6 Do not misuse the tools

Numerous technological tools are available to assist you in visualizing numeric information. Make sure your focus is on the substance and message of the chart, rather than on the methodology, design or technology of the graphic presentation.

Basic spreadsheet software has more than 70 standard chart types to choose from, plus the ability to create customized charts. This exciting range of options often inspires information providers to use all sorts of different ways to visualize data - just because they can. The result, however, can often be over-complication or distortion of statistical information.

This danger increases with the ever-growing flashiness and variety of new tools available. When using these tools, you should keep in mind that technology is simply a means to an end. The message contained within statistical information is far more important than showing how many flashy tools you may know how to use.

2.7 Checklist for developing good data visualizations

When producing visual presentations, you should think about:

- **The target group:** different forms of presentation may be needed for different audiences (e.g. business or academia, specialists or the general population).

- **The role of the graphic in the overall presentation:** analysing the big picture or focusing attention on key points may require different types of visual presentations.

- **How and where the message will be presented:** a long, detailed analysis or a quick slideshow.

- **Contextual issues that may distort understanding:** expert or novice data user.

- **Whether textual analysis or a data table would be a better solution.**

- **Accessibility considerations:**
  - Provide text alternatives for non-text elements such as charts and images.
  - Don't rely on colour alone. If you remove the colour, is the presentation still understandable? Do colour combinations have sufficient contrast? Do the colours work for the colour blind (red/green)?
  - Ensure that time-sensitive content can be controlled by the user (e.g. pausing of animated graphics).

- **Consistency across data visualizations:** ensure that elements within visualizations are designed consistently and use common conventions where possible (e.g. blue to represent water on a map).

- **Size, duration and complexity:** Is your presentation easy to understand? Is it too much for the audience to grasp at a given session?

- **Possibility of misinterpretation:** test your presentation out on colleagues, friends or some people from your target group to see if they get the intended messages.

3. Tables

3.1 Why tables are important

Good tables are an integral part of your package, whether this is a news release, an analytical article or a research paper. Using tables effectively helps minimize the number of data values in your text. It also eliminates the need to discuss less significant variables that are not essential to the story line.

In her book on writing about numbers, Miller (2004) gives the following guidelines on how to design good tables:

- Make it easy for your audience to find and understand numbers within your tables.
- Design both the layout and the labeling of your tables in a straightforward and unobtrusive fashion, so the attention is on the substantive points to be conveyed by your data, rather than on the structure of the table.

In this chapter, we cover what makes an effective table.

3.2 Two types of tables

You should be concerned with two types of tables. The first are smaller tables, called presentation (or demonstration) tables. They can be used to highlight key figures in a press release, web page or analytical publication.

The second type consists of larger tables, called reference tables. They are increasingly being replaced with interactive databases that allow users to generate their own tables online. As reference tables are more of an analytic tool, they will not be discussed here.

In presentation tables, data should be presented in a concise, well-organized way to support the accompanying analysis. A small, well-formatted table can provide a great deal of information that readers can quickly absorb.

Tables should be able to stand alone, whether published within a report, article, publication or web page. Each table should contain enough metadata, such as a descriptive title and indication of source, to allow it to be copied and pasted into another document and still make sense. If you ensure that your tables can stand alone, they are more likely to be understood correctly, within or outside their original context.

3.3   Checklist for designing a good table

Five support components are needed to describe the data displayed in a table:

- The **table title** should give a clear and accurate description of the data. It should answer the three questions "what", "where" and "when". Be short and concise, and avoid using verbs.

<table>
<tr><td align="center">**GOOD EXAMPLE**</td></tr>
<tr><td>"Planned age of retirement by occupation, Canada, 2007."</td></tr>
<tr><td>This text gives all the information needed to understand and use the data correctly.</td></tr>
</table>

- **Column headers**, at the top of the table, should identify the data presented in each column of the table and provide any relevant metadata (e.g. unit of measurement, time period or geographic area).
- **Row stubs**, in the first column of the table, should identify the data presented in each row of the table.
- **Footnotes**, at the bottom of the table, may provide any additional information needed to understand and use the data correctly (e.g. definitions).
- The **source line**, at the bottom of the table, should provide the source of the data, i.e. the organization that produced the data and the data collection method (e.g. population census or labour force survey).

The figure below shows how these table components should be displayed.

<table>
<tr><td colspan="2">**Table title**</td></tr>
<tr><td rowspan="2">**Row stubs**</td><td>**Column headers**</td></tr>
<tr><td>Data</td></tr>
<tr><td>Footnotes</td><td></td></tr>
<tr><td>Source</td><td></td></tr>
</table>

In a presentation table, you should display only a small subset of your data selected to best communicate your message, as illustrated in the example below.

GOOD EXAMPLE of a presentation table

Manufacturing sales in Canada, provinces and territories, June-July 2008
Seasonally adjusted

	June 2008[r]	July 2008[p]	June-July 2008
	$ millions		% change[1]
Canada	**52 685**	**54 105**	**2.7**
Newfoundland and Labrador	692	674	-2.5
Prince Edward Island	123	115	-6.1
New Brunswick	1 914	1 872	-2.2
Quebec	13 019	13 280	2.0
Ontario	23 902	25 015	4.7
Manitoba	1 360	1 445	6.2
Saskatchewan	1 079	1 108	2.8
Alberta	6 298	6 316	0.3
British Colombia	3 347	3 306	-1.2
Yukon	3	4	45.5
Northwest Territories and Nunavut	4	3	-27.4

[r] Revised

[p] Preliminary

[1] The percentage change is calculated from data in thousands of Canadian dollars

Source: Statistics Canada

Data values should be set out so key information can be extracted easily. Users may find it easier to scan down columns or across rows, depending on your message. You should consider this when deciding whether to present your table in portrait or landscape orientation. Lines or subtle shading can also be used to encourage users to read horizontally, as well as vertically. Spacing and shading can change the way a table is read.

Columns should be evenly spaced and not too far apart. The table should only be as wide as the data content requires.

To ensure that your tables are easy to understand, you should consider the following guidelines:

- Avoid unnecessary text.

- Display your data either by chronological order for time series or by using some standard classification. For longer time series, it may be more appropriate to use the reverse chronological order (i.e. starting with the most recent period and going backwards) in some cases, such as for monthly unemployment.

- Use a minimum of decimal places.

- Use thousand separators. Using a space instead of a symbol can avoid the problem of having to translate between languages.

- Align the numbers on the decimal point (or on the right in the absence of decimal places) so their relative value is clear. Do not centre the numbers in a column, unless they are all the same magnitude.

- Do not leave any data cell empty. Missing values should be identified as "not available" or "not applicable". The abbreviation "NA" can apply to either, so it needs to be defined.

Some of these guidelines are discussed and illustrated in the next section.

When producing a series of tables for a publication or a website, you should use the same layout in all tables. Consider how much information needs to be provided in table titles (what is obvious and what is not) and be consistent in the use of abbreviations.

3.4   The use of rounding and decimals

Many non-statistical users find it difficult to see the difference between numbers when three or more digits vary. You can help them by rounding the values presented in your tables. Rounding can also be used when the data do not have a high degree of accuracy. In some cases, only rounded data are reliable and should therefore be displayed in tables. You should, however, take care not to lose too much information when rounding your data.

GOOD EXAMPLE	BAD EXAMPLE
1 320 000	1324567
1 670 000	1673985
1 830 000	1829456

In the example above, the rounded numbers on the left are easier to understand and memorize than the exact numbers on the right. The use of a space as a thousand separator is also illustrated in this example.

If you need to display values with varying numbers of decimal places, you should align them on the decimal point, not on the right. In the example below, the values on the left are easier to read than those on the right. This example also shows that it is much better to display the same number of decimal places in all values.

GOOD EXAMPLE	BAD EXAMPLE
93.2	93.2
1045.0	1045
385.6	385.63

Numeric values should be right justified. Using the same example, notice how difficult it is to read the values when the numbers are justified to the left margin as shown below.

GOOD EXAMPLE	BAD EXAMPLE
93.2	93.2
1045.0	1045.0
385.6	385.6

3.5   Example of how to improve a table

To illustrate the effectiveness of the guidelines presented in section 3.3, we show below an example of a bad table and how it can easily be improved.

BAD EXAMPLE

Final energy consumption by sector - Percentages

	1980	1985	1990	1995	2000	2002	2003
Transport	27.81	27.92	28.24	31.12	36.82	39.48	39.13
Residential	31.11	33.91	30.41	27.61	24.33	23.71	23.97
Industry	31.47	27.21	23.86	22.11	21.41	19.53	18.78
Agriculture	n/a	n/a	3.51	3.7	3.11	2.91	2.82
Services	9.61	10.96	13.98	15.46	14.33	14.37	15.3
Total	100	100	100	100	100	100	100

What is wrong in the table above?

- We do not know which geographic area the data refer to.

- The data source is not identified.

- The values are centered rather than right-aligned.

- The values should not be displayed with two decimal places (too much information).

- The total values should have the same number of decimal places as the other values.

- The abbreviation "n/a" is not explained.

- The grey shading and the lines of the same size between each row and each column do not help to understand the different data presented in the table.

- The table is unnecessarily spread across the width of the page.

<div align="center">

GOOD EXAMPLE

</div>

Share of total energy consumption, by sector (in percent)
Ireland, 1980-2003

	1980	1985	1990	2000	1995	2002	2003
Transport	27.8	27.9	28.2	31.1	36.8	39.5	39.1
Residential	31.1	33.9	30.4	27.6	24.3	23.7	24.0
Industry	31.5	27.2	23.9	22.1	21.4	19.5	18.8
Agriculture	n/a[1]	n/a[1]	3.5	3.7	3.1	2.9	2.8
Services	9.6	11.0	14.0	15.5	14.4	14.4	15.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Data on energy consumption for the agricultural sector was not collected until 1990.
Source: Department of Public Enterprise, Ireland

How has the table been improved?

- All the information needed to understand the data is provided in the title and subtitle.

- The data source is identified.

- All values are right-aligned and displayed with one decimal place.

- The abbreviation "n/a" is explained in the footnote.

- Only the lines that separate the different components of the table (header, data, footnote and source) are displayed and the unhelpful shading has been removed.

- The table is not wider than needed to display all the headings and data.

4. Charts

4.1   Why use charts?

Statistics can often be better understood when they are presented in a chart than in a table. A chart is a visual representation of statistical data, in which the data are represented by symbols such as bars or lines. It is a very effective visual tool, as it displays data quickly and easily, facilitates comparison and can reveal trends and relationships within the data.

A chart generally takes the form of a one- or two-dimensional figure, such as a bar chart or a line chart. Although there are three-dimensional charts available, they are usually considered too complex to be easily understood.

Charts can be used to illustrate patterns in a large amount of data or to communicate a key finding or message. You should consider using charts if you want to show:

- **Comparison:** How much? Which item is bigger or smaller?

- **Changes over time:** How does a variable evolve?

- **Frequency distribution:** How are the items distributed? What are the differences?

- **Correlation:** Are two variables linked?

- **Relative share of a whole:** How does one item compare to the total?

In this chapter, we examine the most common types of charts and give guidelines to producing good charts.

4.2   Checklist for designing a good chart

If you decide that a chart is the most appropriate way to present your data, then no matter what type of chart you use, you need to keep the following three guidelines in mind:

1. **Define your target audience**: What do they know about the issue?

2. **Determine the message you want to communicate**: What do the data show? Is there more than one message?

3. **Determine the nature of your message**: Do you want to compare items, show time trends or analyze relationships in your data?

> **A good chart:**
> - grabs the reader's attention;
> - presents the information simply, clearly and accurately;
> - does not mislead;
> - displays the data in a concentrated way (e.g. one line chart instead of many pie charts);
> - facilitates data comparison and highlights trends and differences;
> - illustrates messages, themes or storylines in the accompanying text.

4.3   When it may not be appropriate to use charts

A chart is not always the most appropriate tool to present statistical information. Sometimes a text and/or data table may provide a better explanation to your audience and save you considerable time and effort.

You should reconsider using charts when your data:

- are very dispersed;
- have too few values;
- have too many values;
- show little or no variation.

<div align="center">

BAD EXAMPLE of a line chart

**Number of students taking English as a second language
at West High School, by first language spoken, 1987 to 2002**

</div>

<div align="center">
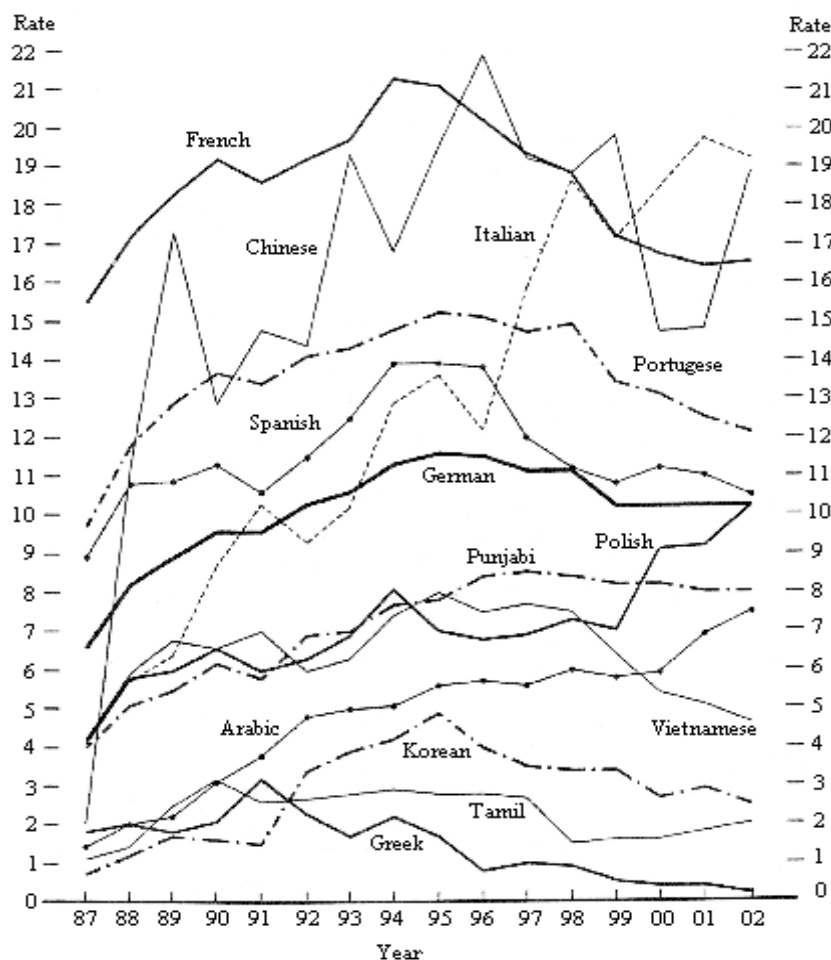
Source: Statistics Canada, *Learning Resources: Using graphs*[5].

</div>

You should avoid anything resembling the line chart above. The data are far too numerous and whatever storylines the analyst hoped to illustrate are lost in the jungle of lines.

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[5] http://www.statcan.gc.ca/edu/power-pouvoir/ch9/using-utilisation/5214829-eng.htm

4.4   Selecting the appropriate type of chart

Knowing what type of charts to use with what type of information is crucial. Some charts are more appropriate than others, depending on the nature of the data. In this section, we provide guidelines for the most common types of charts: bar charts and population pyramids, line charts, pie charts and scatter plots.

Bar charts

A bar chart is the simplest type of chart to draw and read. It is used to compare frequencies or values for different categories or groups.

GOOD EXAMPLE of a bar chart

Female ambassadors in 2006

Source: UNECE Statistical Database
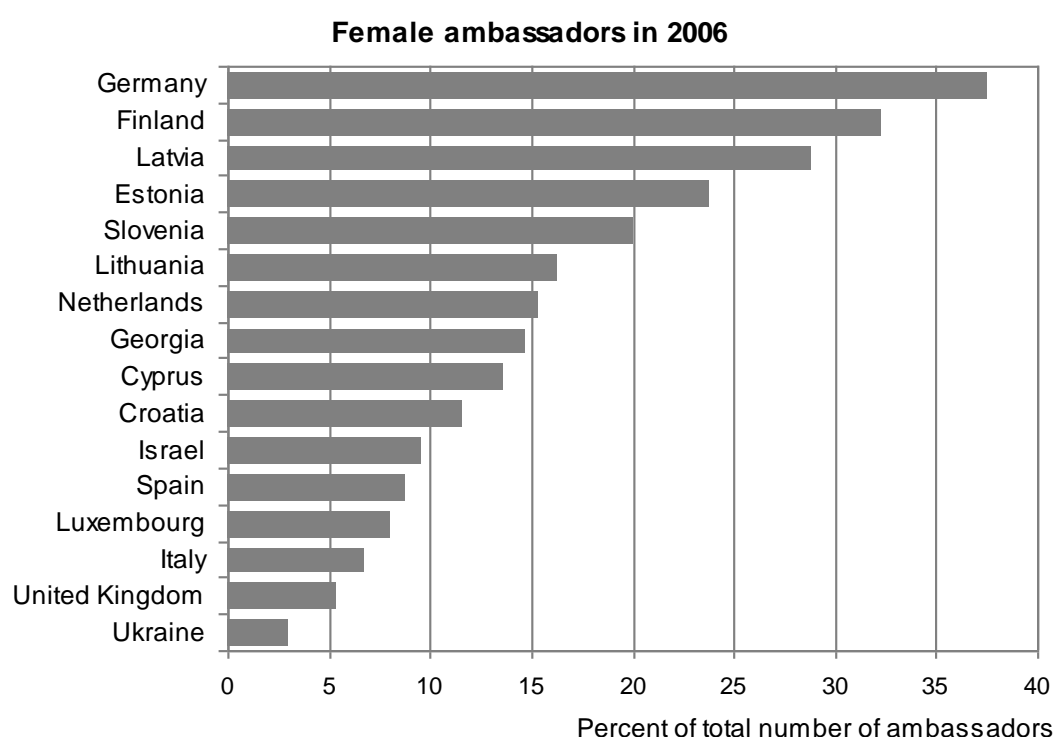
The bars can be either vertically or horizontally oriented. In the horizontal orientation, the text is easier to read, as in the example above. It is also easier to compare the different values when the bars are ordered by size from smallest to largest, rather than displayed arbitrarily.

The bars should be much wider than the gaps between them. The gaps should not exceed 40% of the bar width.

A stacked bar chart can be used to show and compare segments of totals. Caution should be exercised when using this type of chart. It can be difficult to analyze and compare, if there are too many items in each stack or if many items are fairly close in size.

GOOD EXAMPLE of a stacked bar chart

Gender split of teachers in Ireland, 2005-2006

Source: UNECE Statistical Database
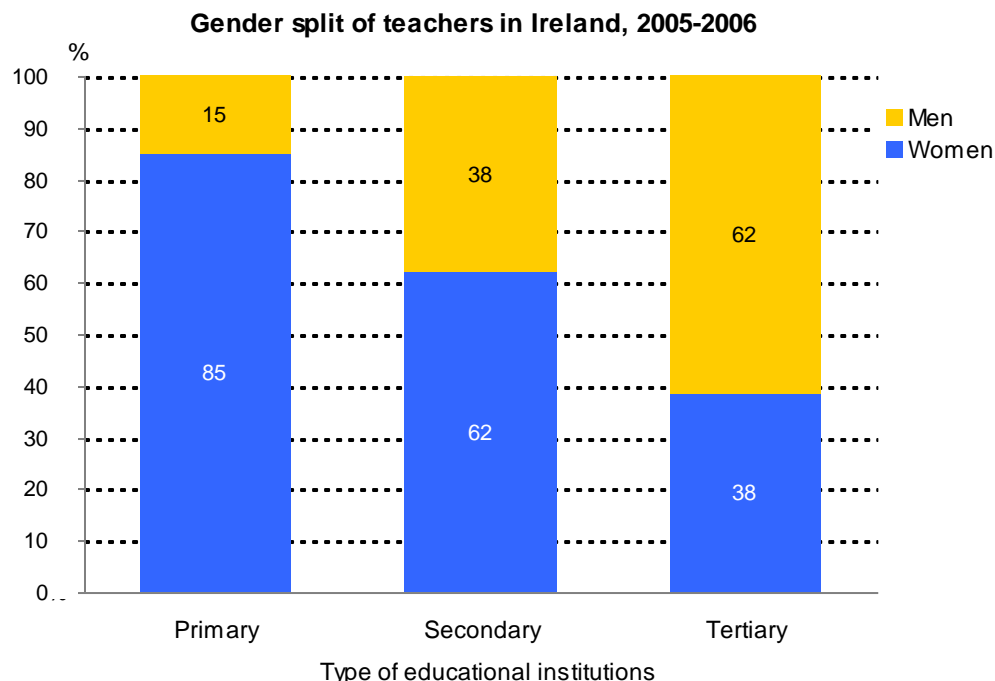
A population pyramid is a combination of two horizontal bar charts, representing the age structure of the female and male population of a country or region. Men are conventionally shown on the left and women on the right. When you want to compare different population pyramids, it is usually better to represent the percentage of men and women in the total population, rather than their number.

GOOD EXAMPLE of a population pyramid

Age pyramids of population of Canada, July 1 1966 and 2006

Source: Statistics Canada[6]

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[6] http://www.statcan.gc.ca/daily-quotidien/061026/figure.htm
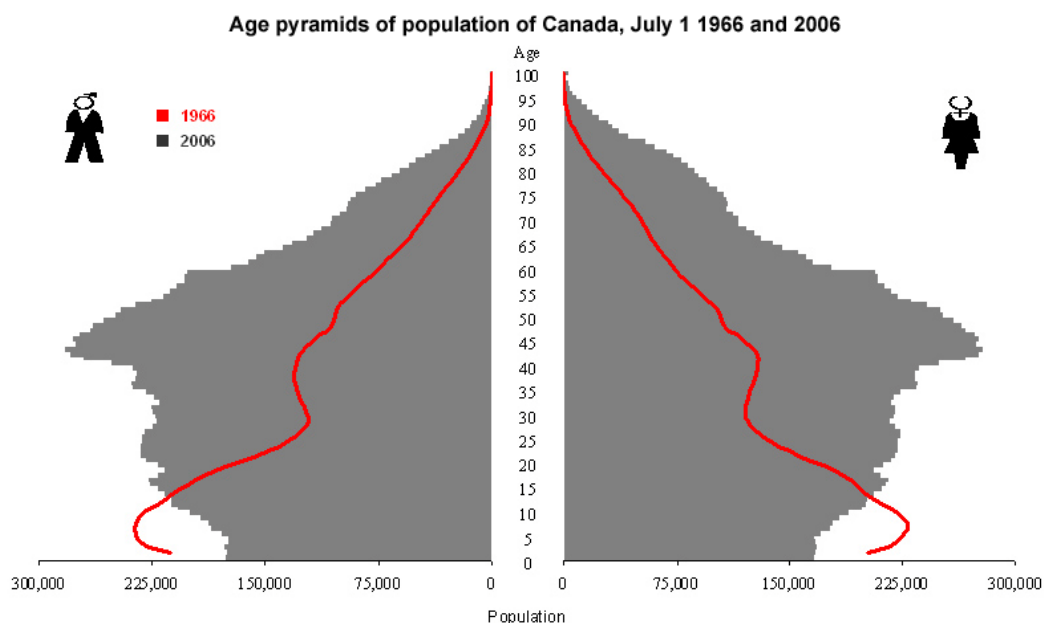
For most European countries, population pyramids do not take the shape of a pyramid any more, but they remain a very effective way of displaying a great deal of information on the age and sex structure of populations, even more so when they are "animated", i.e. moving through time.

Line charts

A line chart is an effective tool for visualizing trends in data over time and is therefore the most appropriate type of chart for time series. You can adjust the chart parameters to better communicate your message, but you should be careful not to distort the data. This issue is discussed and illustrated in section 4.6.

GOOD EXAMPLE of a line chart

Unemployment rate, 1990-2008

Source: UNECE Statistical Database
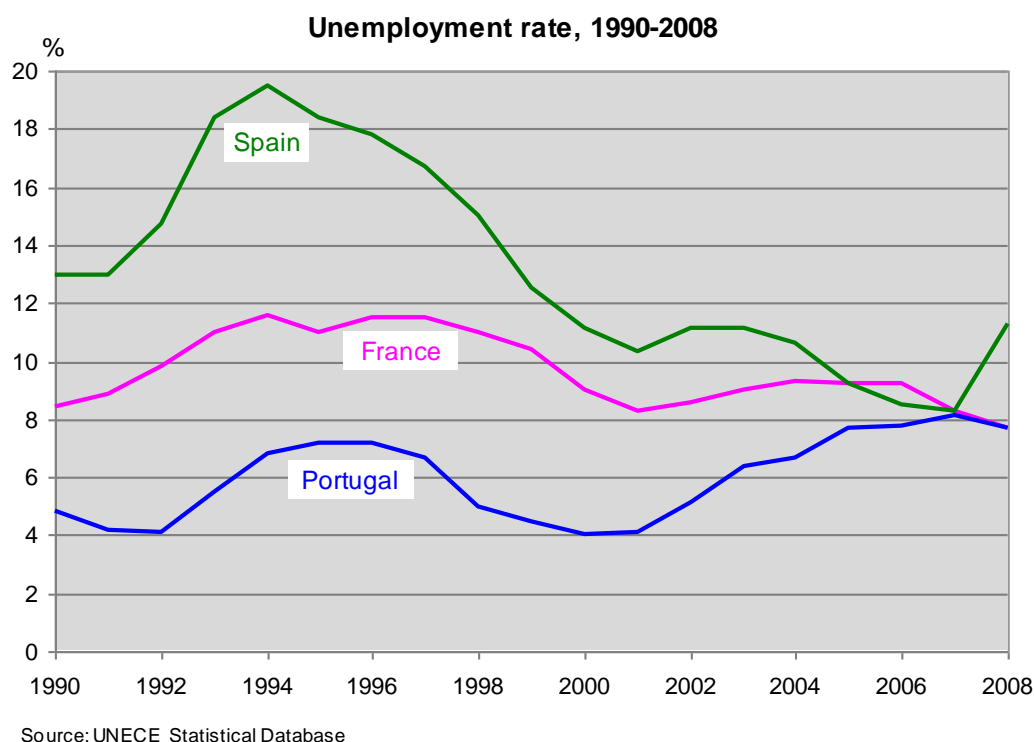
Pie charts

A pie chart can be used to show the percentage distribution of one variable, but only a small number of categories can be displayed, usually not more than six. The use of this type of chart is not recommended by many statisticians, as it can be difficult to compare the different segments of the pie and, even more, to compare data across different pie charts. To overcome this problem, the segments can be labeled with their actual values. In some cases, the category names can also be written as labels on the chart, so that the legend is not necessary. Segments are usually best presented in order from smallest to largest segments, rather than interspersing small and large segments.

In most cases, other types of charts (e.g. bar charts) are more appropriate, but pie charts should not be completely ruled out, as they are effective to visualize the relative importance of one category in the total. Pie charts can be well suited to provide an overview of a situation, such as in the example below.

GOOD EXAMPLE of a pie chart

Employment by major sectors in Latvia, 2007

WOMEN

7% Agriculture

16% Industry

77% Services

MEN

12% Agriculture

47% Services

40% Industry
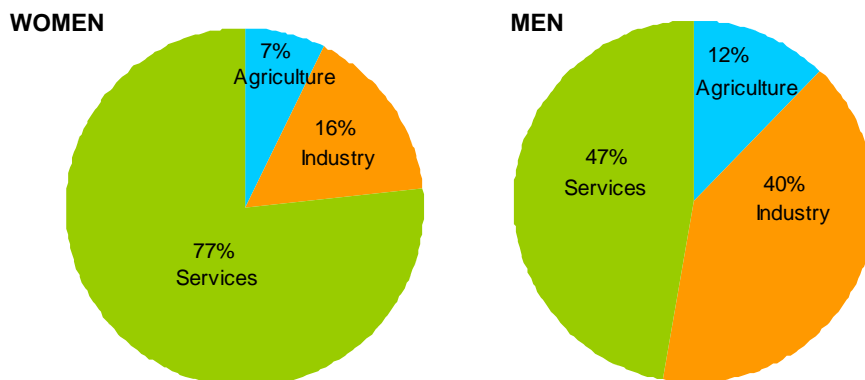
Source: UNECE Statistical Database

Scatter plots

A scatter plot is used to show the relationship between two variables. It is the most accurate way to display correlations, as illustrated in the example below. However, some analysts prefer to use bar charts, as scatter plots can be difficult to interpret.

GOOD EXAMPLE of a scatter plot

Under-five mortality and underweight prevalence in Sub-Saharan African countries, 2003
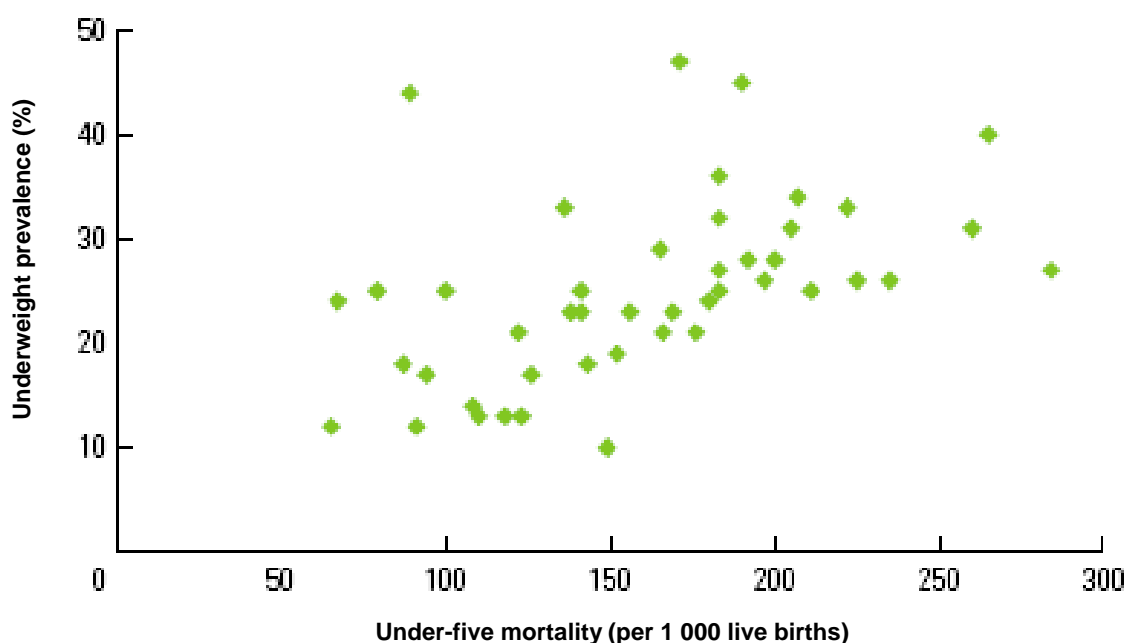
Source: Jamison et al. (2006) *Disease and Mortality in Sub-Saharan Africa, 2nd edition*, Washington D.C., The World Bank[7].

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[7] http://www.dcp2.org/file/66/Disease and Mortality in SSA.pdf

Experimenting with different types of charts

Which type of chart should you use? You have to make that decision. A good practice is to experiment with different types of charts to select the most appropriate tool to communicate your message.

Below are two different ways to graph the same data. Which one is clearer?
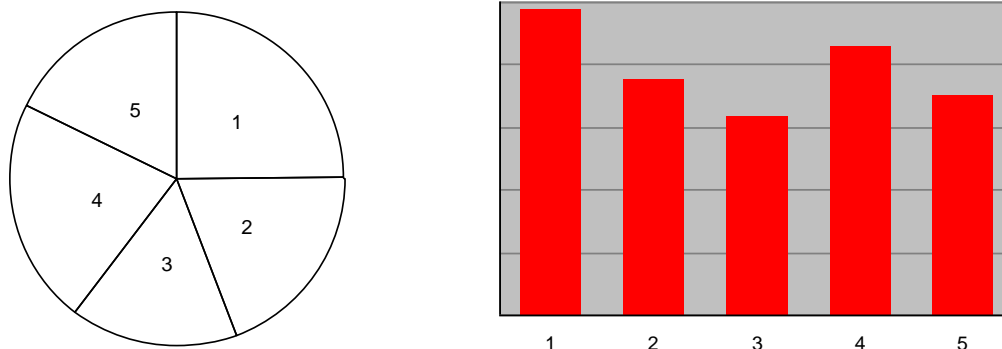
Can you tell which segment on the pie chart is the biggest one? Some readers tend to find it more difficult to compare angles than bars or lines. On the pie chart, segments 1 and 4 look practically the same, while the difference in their relative size is immediately clear on the bar chart.

4.5   What makes an effective chart

Chart components

The different chart components compete with each other for the reader's attention. The more features you include, the harder it becomes to see your point.

Chart components fall into three categories:

1. **Data components** that represent the data: bars, lines, areas or points.

2. **Support components** that assist in understanding the data: title, legend, data labels, gridlines, footnotes and data source.

3. **Decorative features** that are not related to the data.

Data components alone are never self-sufficient. To ensure correct understanding of your charts, you need to include the following support components:

- The **chart title** should give a clear idea of what the chart is about. It has to be short and concise. You can have two types of titles:

  o An **informative title** provides all the information needed to understand the data. It should answer the three questions "what", "where" and "when".

  o A **descriptive title** is a caption that highlights the main pattern or trend displayed in the chart. It states in a few words the story that the chart illustrates.
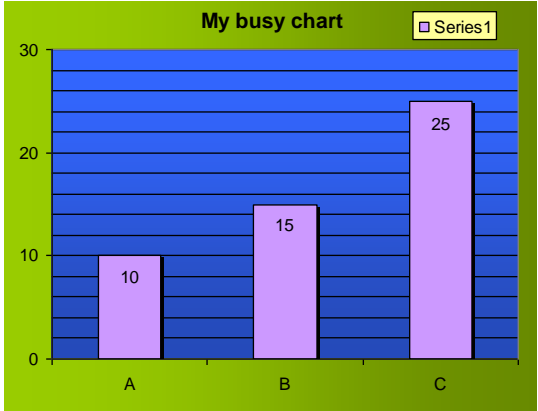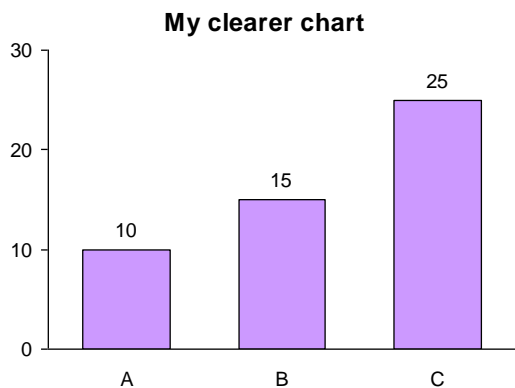
- The **axis labels** should identify the values displayed in the chart. The labels are displayed horizontally on both axes.

- The **axis titles** should identify the unit of measure of the data (e.g. "in thousands", "%", "age (in years)" or "$"). You do not need to include an axis title when the unit of measure is obvious (e.g. "years" for time series).

- **Gridlines** can be added in bar and line charts to help users read and compare the values of the data.

- The **legend and data labels** should identify the symbols, patterns or colors used to represent the data in the chart. The legend should not be displayed when only one series of values is represented in the chart. Whenever possible, you should use data labels rather than a legend. Data labels are displayed on or next to the data components (bars, areas, lines) to facilitate their identification and understanding.

- A **footnote** may be used to provide definitions or methodological information.

- The **data source** should be identified at the bottom of the chart.

It's all about the data

To maximize the efficiency of a chart, data should take centre stage. Support components should:

- **Only be present if relevant.** Title axes, legend and data labels may be essential for the correct understanding of your chart or may not be needed at all, depending on the nature of your data.

- **Be subtle.** Use lighter lines for axes and gridlines than for data components. Decorative feature should not distract the reader's attention.

BAD EXAMPLE	GOOD EXAMPLE
All components have maximum impact. The result is a busy chart, difficult to read, even though it shows only three values.	This chart is much easier to read. Minimal use of support components ensures that data take centre stage.

Data components can also conflict with each other. The more variables and values you want to display, the more difficult it is to present the data clearly. An effective chart has a clear, visual message. If a chart tries to do too much, it becomes a puzzle that requires too much work to understand. In the worst case, it is just plain misleading.

4.6   Adjusting the chart parameters

When designing a chart, you can adjust the scales to best convey your message. The two line charts below display the same data, but they provide very different pictures:


This chart shows an overall trend of stability for about 10 years, followed by moderate growth.	By reducing the scale on the y-axis, you can highlight the changes. Small increases and decreases appear in the first 10 years and the growth at the end of the period seems more dramatic.
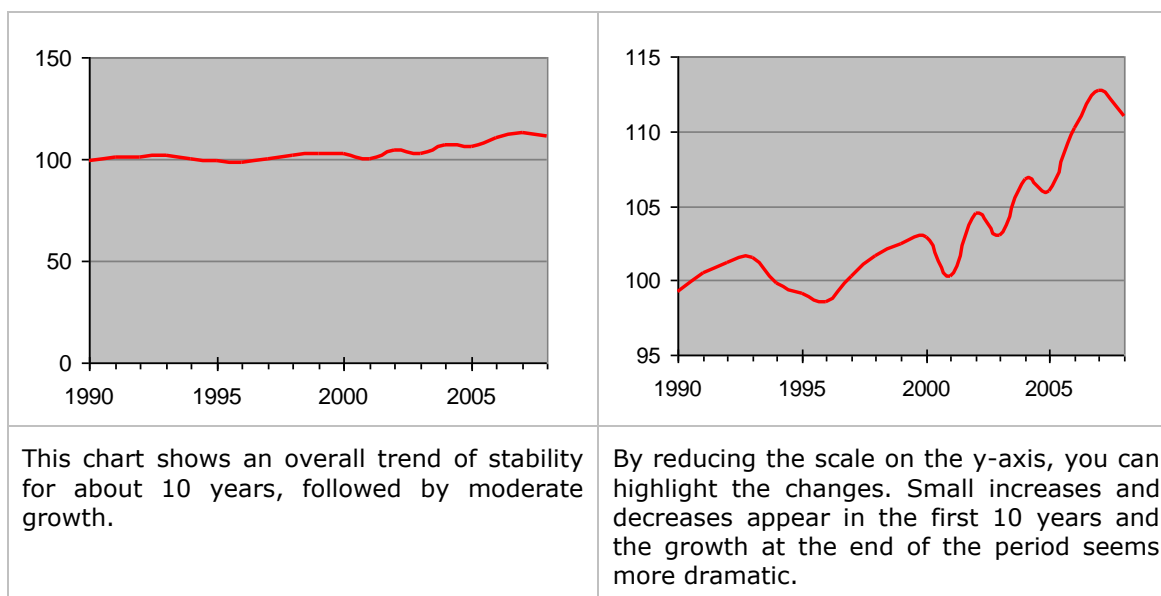
It is good practice to use some symbol to indicate when the scale of values does not start at zero, such as on the y-axis in the right-hand side example above. The best option is to start from zero and put either a zigzag line or a break, as illustrated in the example below.

GOOD EXAMPLE of a chart with a y-axis not starting at zero

Pensionable income for persons aged 20-64 in Sweden, 2004

Average income in thousands Swedish Krona
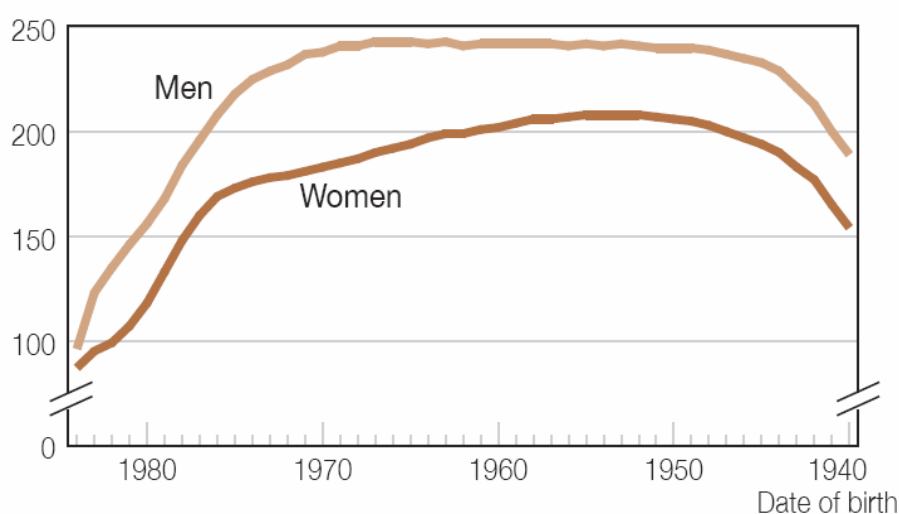
Source: Statistics Sweden (2006), *Women and Men in Sweden: Facts and figures 2006*[8].

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[8] http://www.scb.se/statistik/_publikationer/LE0202_2006A01_BR_X10ST0602.pdf

4.7 Controlling the cognitive load of your charts

Your data may contain several messages that you want to highlight using a chart. Charts, like every element in a publication, can be assigned a "cognitive load". Cognitive load basically means how hard the reader has to work to understand what you are trying to communicate. A chart with a high cognitive load will be hard to understand and to remember. Its message will be difficult to communicate. A chart with a low cognitive load will be understood at a glance. Its message will be obvious. Most guidelines about effective chart design are meant to keep cognitive load low.

When you design a chart, you control its cognitive load. You can lower it and send a clear message, by using appropriate conventions and formats. You can also deliberately attempt to raise the cognitive load of your chart, if you want your audience to focus on a subtle aspect of your data. By raising the cognitive load, you force readers to consider the chart from a different point of view. Below is an example of a chart with a high cognitive load.

GOOD EXAMPLE of a chart with a high cognitive load

Wage dispersion in occupational groups
that require higher education in Sweden, 2004
Monthly salary in Swedish Krona (SEK)
The two upper bars in each occupational group show women and men
in the private sector, the two lower bars show the private sector.
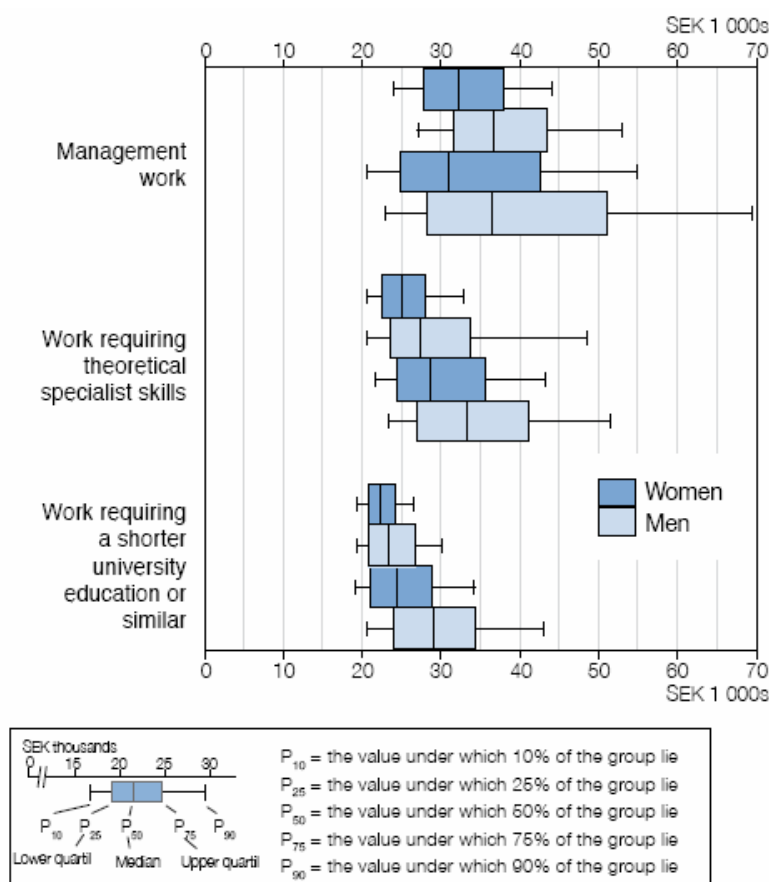
Source: Statistics Sweden (2008), *Women and Men in Sweden: Facts and figures 2008*[9].

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[9] http://www.scb.se/statistik/_publikationer/LE0202_2008A01_BR_X10BR0801ENG.pdf

4.8   Suggestions to improve your charts

Be accurate

Graphical objects must be sized to present ratios accurately. A chart that displays data as objects with disproportionate sizes, such as in the example below, is misleading.

BAD EXAMPLE of relative size between chart objects
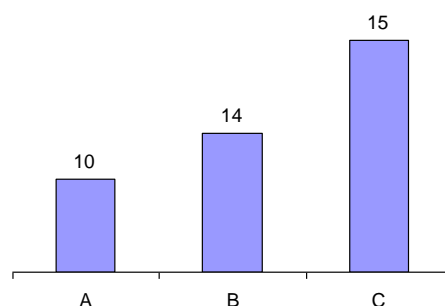
Sort your data

When using bar or pie charts, you should sort your data from smallest to largest values, so they are easier to compare.

BAD EXAMPLE	GOOD EXAMPLE
The data are presented by alphabetical order of countries. The values are very difficult to compare. Attention is on the first and last values, which have no specific relevance.	The data are presented in order from smallest to largest values. It is easy to compare them. Attention is focused on the minimum and maximum values of the dataset.

Avoid misleading correlations

Plotting variables with different scales on the same chart is likely to result in erroneous conclusions. The fact that two curves move together is not sufficient to establish a correlation.

The chart below attempts to link suicide and long-term unemployment rates in Japan. Both curves appear to move together, but the two variables are different. One is the number of suicides **per 100 000** population, while the other is the number of unemployed for 12 months or more as a **percentage** of the total number of unemployed. Both variables happen to have values between 10 and 35

over the whole period, but any slight change in definition or scale would have produced a very different chart. This chart is successful at conveying an impression that both variables are linked, but it cannot and does not prove it.

BAD EXAMPLE: misleading correlation between two variables

Suicide and long-term unemployment in Japan
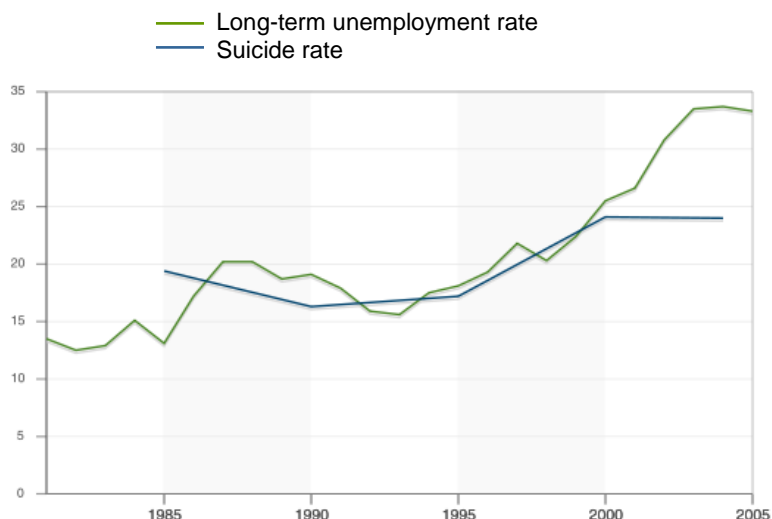
Source: Swivel[10]

Use dual y-axes with caution

Dual y-axes have the potential to cause confusion. You may be able to use this type of chart successfully if you have two different variables (e.g. price and quantity). But you should be very careful with your labels and show each data line in the same colour as the axis the user needs to consult, as shown in the example below.

GOOD EXAMPLE of a dual y-axes chart

World demand and world oil prices
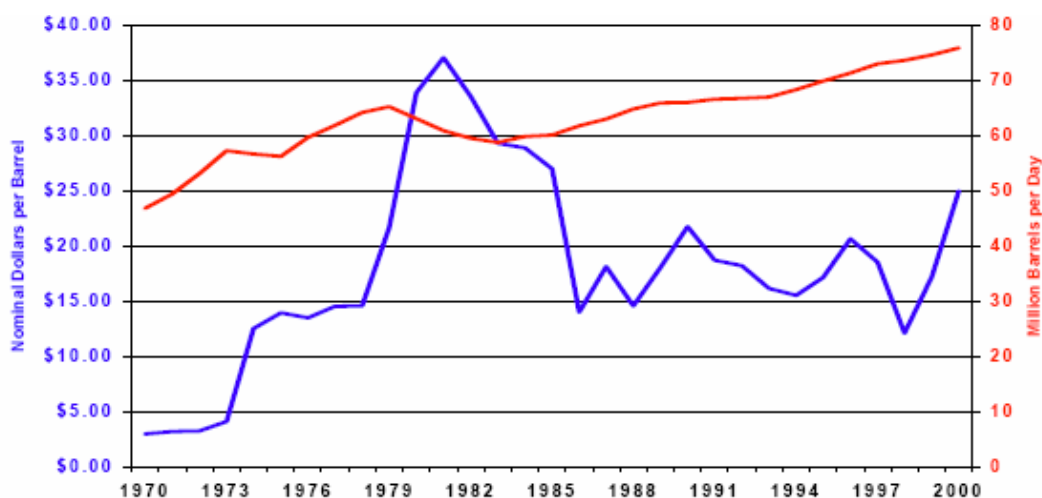
Source: Blessing et al. (2003), *Cognitive Testing of Statistical Graphs: Methodology and Results[11]*.

---

[10] http://www.swivel.com/graphs/show/28847825
[11] http://www.fcsm.gov/03papers/BlessingBradsher.pdf

When you have similar units on two different scales in the same chart, you can confuse even experts in the subject. Lines might "cross" in a dual y-axis chart that, if drawn on the same scale, would not be anywhere close to each other.

Avoid unnecessary graphic features

Any graphic features that do not show something about the dataset you are representing will make your chart less legible. This is especially true when using three dimensions for charts that represent simple datasets. Although software is available to easily produce three-dimensional charts and some people may consider them attractive, they often distort the data. The message is much easier to understand when presented in a simple two-dimensional format, as shown below.
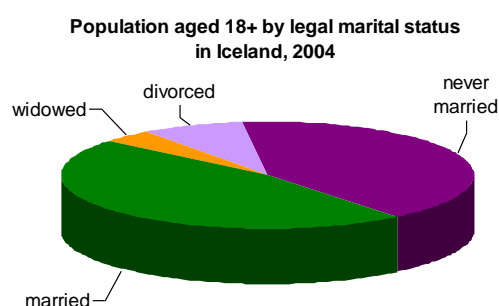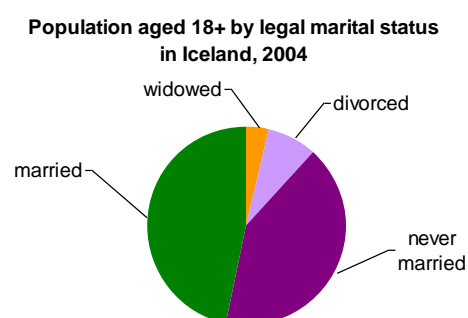
Three-dimensional charts rarely add value and often confuse readers. The images have depth, making some parts appear closer and others further away. The brain compensates for this by believing the objects that look like they are in the distance are larger. However, when representing data that have more than two attributes, using depth can in fact allow readers to understand your point more clearly.

You should generally avoid adding any feature that does not carry any data. For instance, using a different colour for each value in a bar chart makes it harder to read, as shown in the example below. You should stick with one colour.
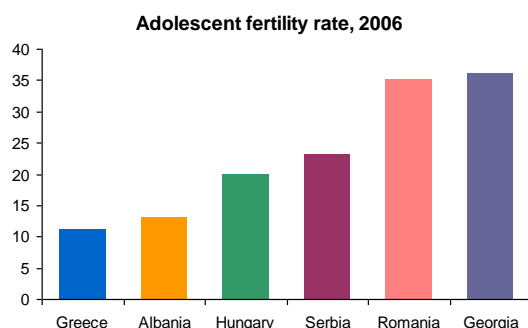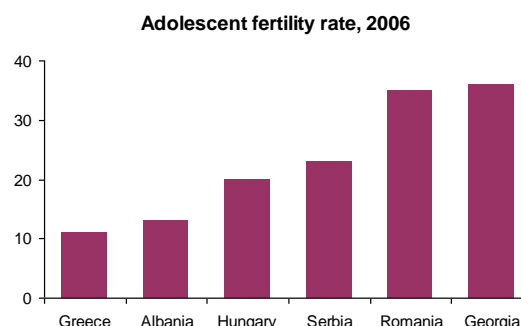
5. Maps

5.1 Why a map is worth a thousand numbers

Geographic information is an integral part of all statistical data. Geographic areas have boundaries, names and other information that make it possible to locate them on the ground and relate statistical information to them. This spatial relationship is particularly important for census data.

Maps are the most efficient tools to visualize spatial patterns. When carefully designed and presented, they are more than just decorative features in a statistical presentation. They can help people identify and highlight distributions and patterns that might not be apparent from tables and charts.

If "a picture is worth a thousand words", then "a map is worth a thousand numbers". In our visual era, maps are a powerful information medium. They serve as valuable decision-making tools for experts, politicians and the general public, and meet a growing demand for information in all parts of society.

The power of maps

Maps are well-designed if they are easy to grasp. They should help people understand a large amount of information at a glance. They can summarize voluminous data tables or long and complicated texts. When you want to present statistical information for all regions of your country, you can produce a whole set of charts, or you can show all the information in a single map.

Many cartographic technologies are now available, from geographic information systems (GIS), which offer a broad range of analytical functions and integrate map components, to high-end cartographic information systems (CIS) for professional map and atlas makers in statistical offices. During the age of paper publications, maps were often underused by statisticians, because they did not show exact numbers. This drawback disappeared with the emergence of interactive mapping tools that allow the user to retrieve the actual data "behind the map".

Using maps in statistics

Maps can be very useful both in the preparation of censuses and surveys and in the analysis and reporting of results. You should consider using maps if you want to:

- show the geographical location and spatial distribution of your data;
- compare different areas;
- summarize a large volume of data and reduce their complexity;
- communicate a clear message;
- validate your findings;
- attract people's attention;
- store spatial information in a geographical information system.

In this chapter, we examine the most common types of maps and give guidelines to producing good maps.

5.2   Checklist for designing a good map

Mapmaking is a mixture of art, science and technology. It is a complex task, as there are unlimited possibilities for organizing the layout.

With the growth of Web 2.0 technologies (see sections 6.2 and 6.4), many interactive mapping tools are available online that allow users to upload their data and retrieve thematic maps instantly. The production of thematic maps has become much cheaper and faster, but it does not automatically result in well-designed maps that communicate your message accurately.

To design a good map, you need to consider the following four guidelines:

1. **Define your target audience:** How and in which context will the map be used? Are there any accessibility constraints?

2. **Determine the message you want to communicate:** What do the data show? Is there more than one message?

3. **Determine the nature of your data:** How many variables should be mapped? Is there a time dimension?

4. **Determine the appropriate mapping technique, colours and symbols:** What is the nature of your data (quantitative or qualitative, absolute or relative values)? Is there any technical constraint (e.g. format or black and white reproduction)? What are the conventions for colours or classifications?

> **A good map:**
>
> * is simple and easily understood;
>
> * has a clear and objective message;
>
> * gives an accurate representation of the data and does not mislead;
>
> * attracts the reader's attention to the most important information;
>
> * is well presented and attractive;
>
> * fits the output format and your audience;
>
> * can stand by itself without further explanations;
>
> * is accessible to colour-blind persons.

5.3   When it does not make sense to produce a map

Before starting to produce a map, you should consider whether it is the most appropriate tool to present your data. Do not waste your time and effort if a chart or a data table can provide a better way to communicate your message.

There is no point in mapping your data if:
* the data have no geographical breakdown;
* there is no significant variation in the data;
* your target audience may have difficulty understanding your map;
* there is not enough space available to present the map so it can be properly read and understood.

BAD EXAMPLE of a map
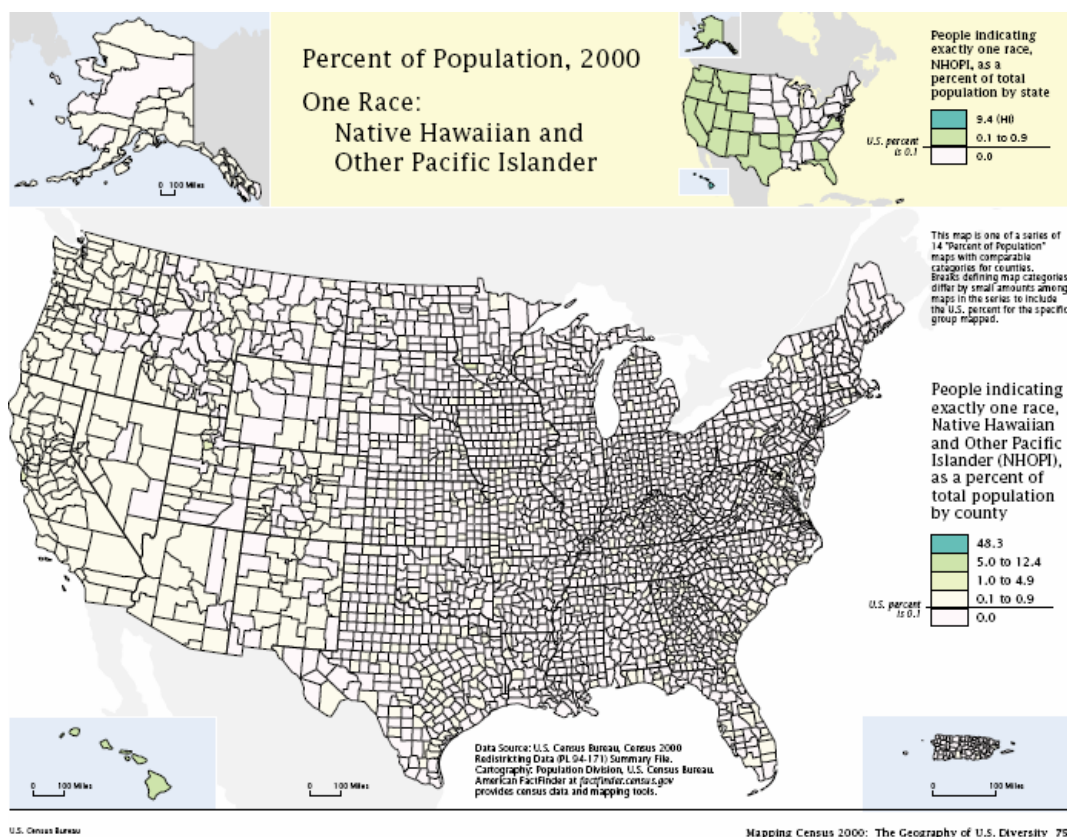
Source: Brewer, C.A. and Suchan, T.A., U.S. Census Bureau (2001), *Mapping Census 2000: The Geography of U.S. Diversity*, U.S. Government Printing Office, Washington DC[12].

The example above illustrates how a map can be wasted when there is not enough information to map. It aims to represent the spatial distribution of a small ethnic group in the United States of America: the Native Hawaiians and Other Pacific Islanders (NHOPI). The map is almost empty, because this group represents less than 1% of the total population in most counties. The few counties that have more than 1% of NHOPI cannot be seen easily.

5.4   Different types of maps

Maps can be classified according to scale, function, design, production technology or the way they are used in a publication.

In general, there are two types of maps:

- **General reference (topographic) maps** are used to support orientation in space and show the location of a variety of different features, such as lakes, rivers, mountains, coastlines, roads, etc. They help users identify the boundaries of geographic areas.

- **Thematic (statistical) maps** are used to show the spatial distribution of one or more statistical attributes. A thematic map is always designed to serve a purpose and answer specific questions about political, social, cultural, economic, agricultural or natural phenomena.

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[12] http://www.census.gov/population/www/cen2000/atlas/index.html

Example of a general reference map   **Example of a thematic map**

Source: swisstopo, the Federal Geo-
Information center[13]
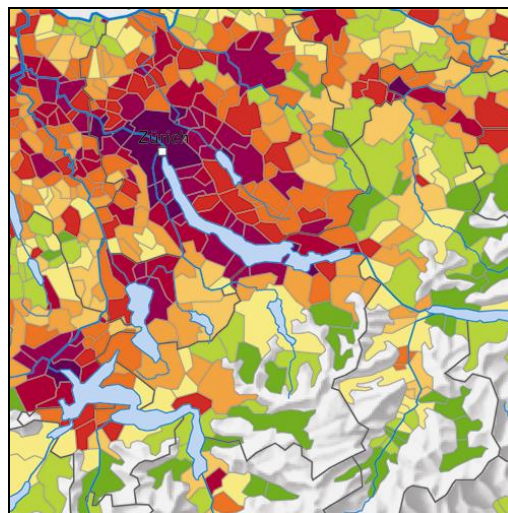
Source: Swiss Federal Statistical Office[14]

Static or interactive maps

Maps can be static or interactive. Static maps cannot be edited by the user. Interactive maps offer flexibility and give the user the ability to alter the design, select and retrieve data, animate the map, and change the topic or focus on aspects that are of key interest.

Maps can be image- or data-based. If a map is solely image-based, it is pre-produced and static in display. When you produce a data-based map, you store all the information (data and metadata) that is needed to create the map in a database. The map itself is only produced when the user requests it on the Internet. With this technique, the user can easily update and change the data and map parameters without having to re-create the map.

Thematic atlases

In its simplest form, an atlas is a bound collection of maps. Thematic atlases present statistics in a comprehensive way and are accompanied and enriched by valuable information in the form of text, charts and tables. Most statistical organizations recognize their potential for conveying data and are producing popular census atlases or thematic atlases (for example, on population, health or the economy).

Atlas technologies have significantly improved over the past decade. Modern online atlas information systems (AIS) allow the user to explore the data behind the maps, click on regions, "tailor" their own maps, integrate their own data, and communicate with the map author or office. Behind the scenes, new production processes have emerged that facilitate the integration of different types of expertise, such as map-making, graphic design, data analysis, writing and translating.

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[13] http://www.swisstopo.admin.ch/internet/swisstopo/en/home.html
[14] http://www.bfs.admin.ch/bfs/portal/en/index/regionen/thematische_karten/maps.html

GOOD EXAMPLE of an online thematic atlas

Source: International Monetary Fund, *IMF Data Mapper* [15].

5.5 Selecting the appropriate type of map

The same advice given for charts also applies to maps: it is crucial to know what type of map to produce with what type of information. The selection of the appropriate mapping technique depends on the nature of the data. This section provides guidelines for the three most commonly used types of thematic maps: choropleth maps, dot maps and proportional symbol maps.

Choropleth maps

The most common type of map is the choropleth map, in which areas are shaded in proportion to the value of the variable being displayed. This kind of map provides an easy way to visualize patterns across space, as shown in the example below.

The abundance of choropleth data and the ease of design using GIS has unfortunately led to frequent misuse of the choropleth mapping technique. Only ratios (i.e. proportions, rates or densities) can be mapped with this technique. You should NOT use it to represent absolute values, such as population size.

---

[15] http://www.imf.org/external/datamapper/index.php

GOOD EXAMPLE of a choropleth map

**Cancer of the larynx: incidence by health authority
Males, UK and Ireland, 1991-99**
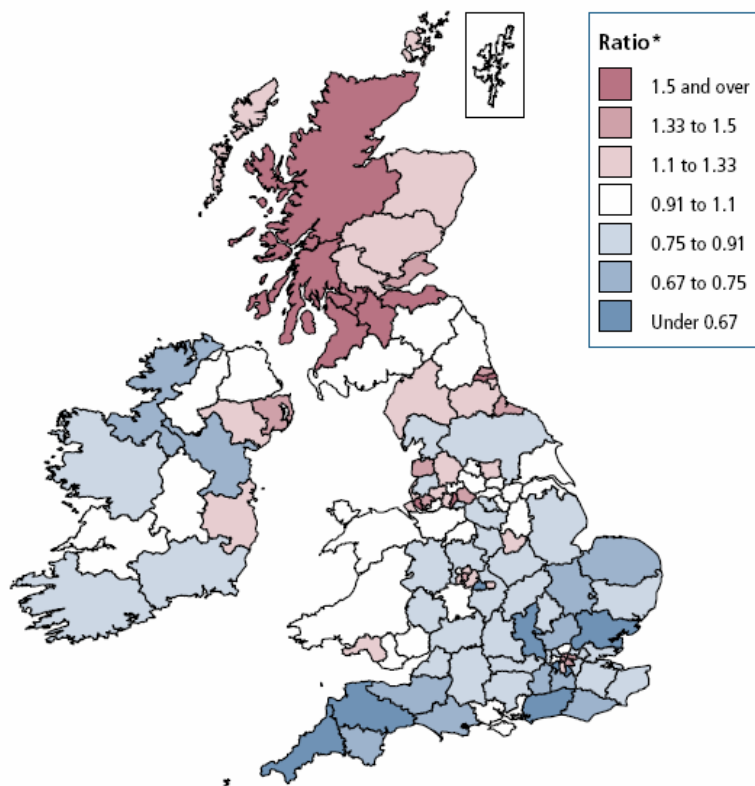
* Ratio of directly age-standardised rate in health authority to UK and Ireland average

Source: Office for National Statistics (2005), *Cancer Atlas
of the United Kingdom and Ireland 1991-2000*, London[16].

A choropleth map is based on data aggregated over pre-defined areas, such as the United Kingdom and Ireland health authorities in the example above. This map type is well suited for discussion about these health authority regions. However, real-world patterns often do not conform to pre-defined areas, which can lead to major misinterpretation. Choropleth maps should, therefore, preferably be used to display phenomena that are evenly distributed within each spatial unit.

Data classification is a major issue with the choropleth technique. The spatial patterns displayed in the map are determined by the grouping of the data values. You can produce different maps with the same data by applying different classification methods, dividing the data into different numbers of classes or selecting different class limits. There are many techniques, but no rules, so you should determine the most appropriate method to classify your data.

Dot maps

A dot (or point) map displays the location and density of a population or phenomenon using symbols. It enables users to quickly grasp the general magnitude of the data, as well as their concentration or dispersion. Each dot represents a discrete value, usually a large number of entities as shown in the examples below.

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[16] http://www.statistics.gov.uk/statbase/Product.asp?vlnk=14059

GOOD EXAMPLE of dot maps
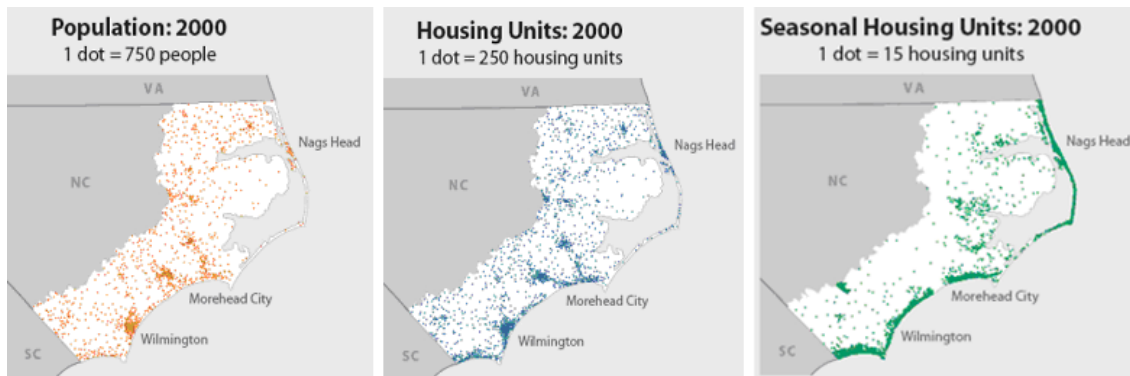
Source: U.S. Census Bureau, *Census Data and Emergency Preparedness[17]*.

Proportional symbol maps

A proportional (or graduated) symbol map is used to display absolute values. The size of the symbol is proportional to the size of the population or phenomenon being represented. Each symbol is attached to a specific point within the spatial unit, usually either the centre or the capital.

Circles are most commonly used, because they are compact and easy to scale. But other geometric shapes, such as squares or triangles, can also be used, as shown in the example below.

GOOD EXAMPLE of a proportional symbol map
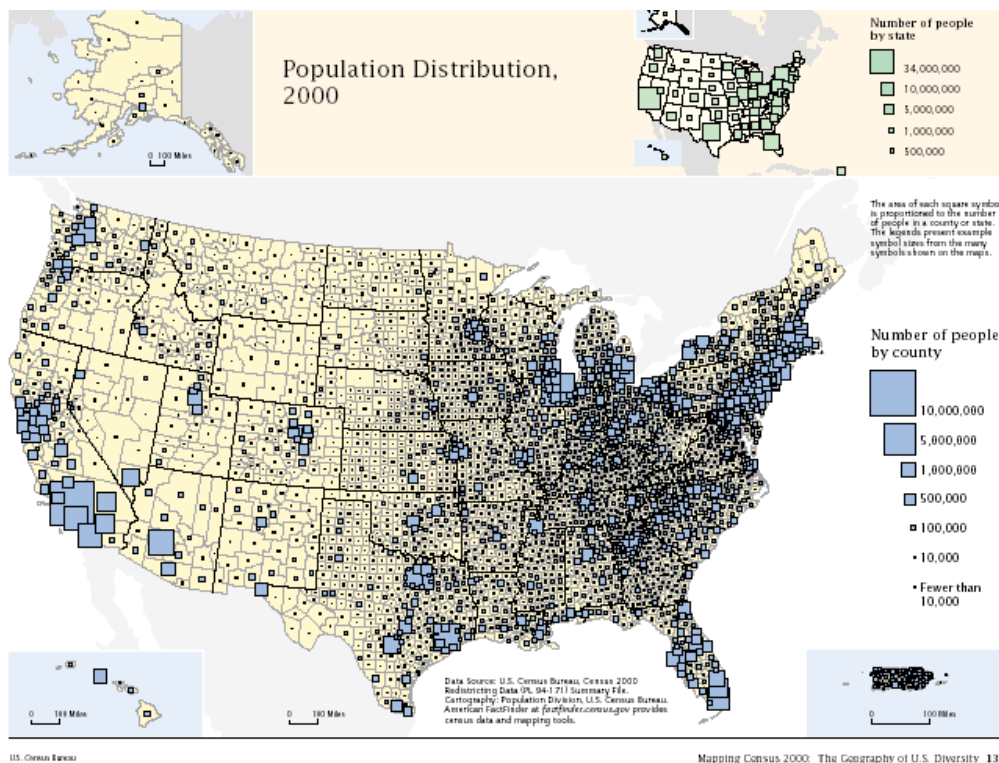
Source: Brewer, C.A. and Suchan, T.A., U.S. Census Bureau (2001), Mapping Census 2000: The Geography of U.S. Diversity*, U.S. Government Printing Office, Washington DC[18].*

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[17] http://www.census.gov/Press-Release/www/emergencies/
[18] http://www.census.gov/population/www/cen2000/atlas/index.html

The example above shows that expert mapping skills may be required to create a well-designed proportional symbol map. When the size of the symbol is bigger than the size of the corresponding spatial unit, it may be difficult to identify the unit that the symbol refers to. This difficulty of interpretation becomes even harder when many symbols overlap, as illustrated in this map of the population distribution in the United States of America.

Chart and mapping techniques can be combined to display the distribution of the different categories of a population on the same map. In complex symbol maps, pie charts or bar charts are used as symbols. In the map of Switzerland below, the pie chart represents the share of the population speaking each of the main national languages (German, French or Italian) or any other language in the 26 cantons. The size of the symbol represents the total population of each canton.

GOOD EXAMPLE of a complex symbol map
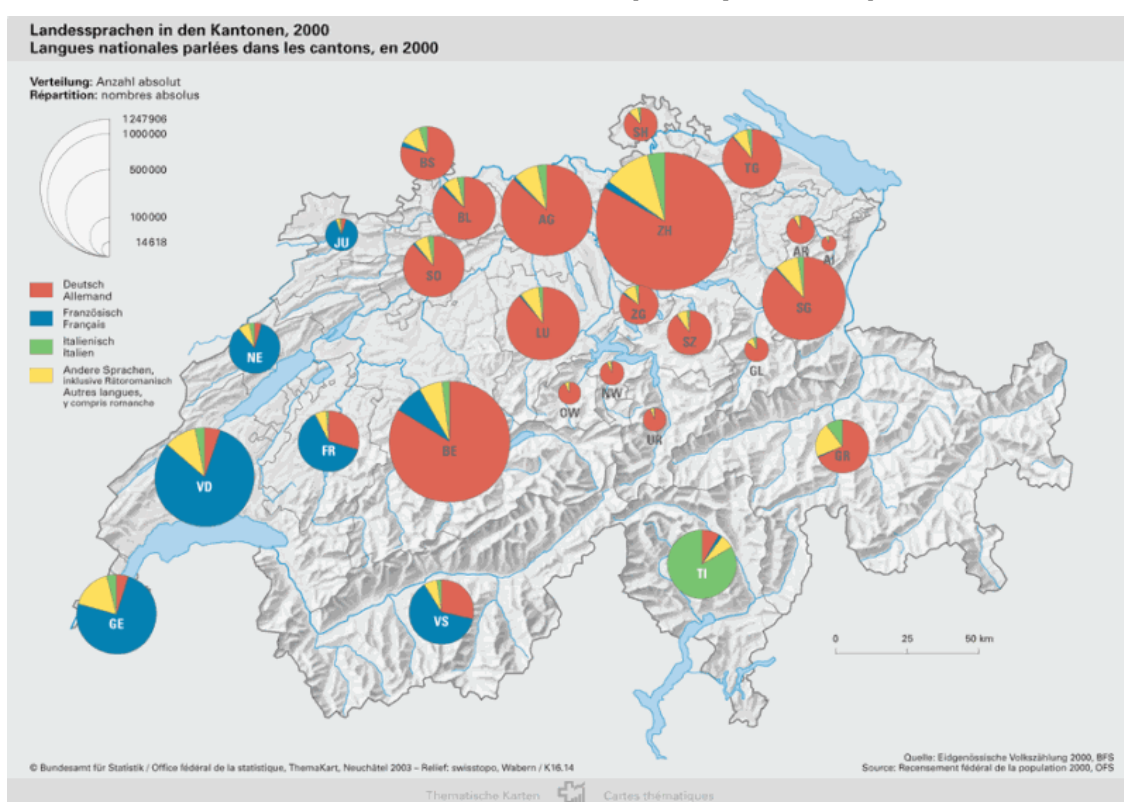
Source: Swiss Federal Statistical Office, *Map Gallery Switzerland – Languages and religions*[19].

This complex technique should be used with great care, as the map and the legend can easily become overloaded. Such maps can only be produced at the national level (e.g. countries in Europe) or regional level (e.g. Swiss cantons in the map above). Moreover, only a small number of categories (not more than five) can be displayed in the pie or bar chart.

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[19] http://www.bfs.admin.ch/bfs/portal/en/index/regionen/thematische_karten/maps.html

5.6   Design tips: keep it simple!

As for all data visualizations, the most important recommendation to ensure that your message gets across is: **keep your map simple!** Be careful not to distract or confuse your audience by displaying too much information or too many visually conflicting elements.

Knowing your audience is also of crucial importance. What is their background? Are they familiar with maps in their everyday life? Could your map offend them in any way? You should be aware of the sensitivities of your target audience. Maps have a powerful visual impact, and some colours or symbols may have a negative connotation for some people.

You should always design your maps so they are **independent of story texts or data tables**. Just like a chart, a map should be understood on its own, without further reference to surrounding text or notes. Once a map is published, it can be scanned or downloaded and used out of context. It is, therefore, essential to include the different map components described below.

GOOD EXAMPLE of a map that does not require any further reference
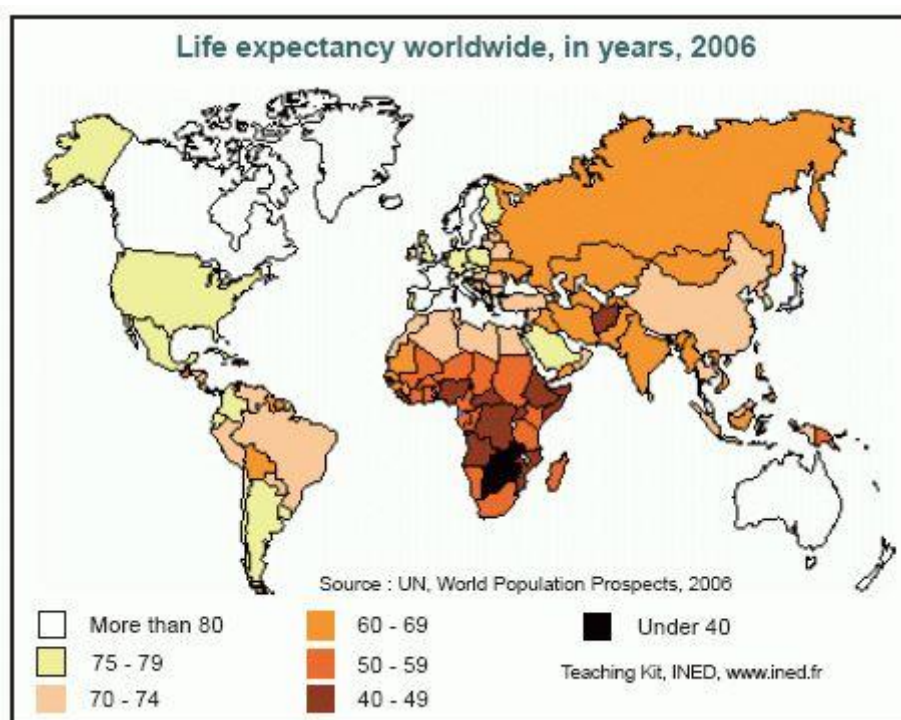
Source: Institut National d'Etudes Démographiques (INED)

Map components

Map components compete with each other for the reader's attention. To maximize the efficiency of your message, ensure that your data are the focus of your layout, especially when other information (water, altitude, etc.) are also presented. The map should cover 80-85% of the total presentation space.

The following components are needed to assist the user in understanding the map:

- The **map title** should give a clear idea of what the map is about. It needs to be short and concise. Subtitles may be added to provide more detailed information (e.g. unit of measure).

- The **legends** should identify all the symbols, patterns and colours used to represent the data in the map.

- The **geographic units** at which the data are represented in the map should be identified, either in the title (or subtitle) or in a legend.

- **Text labels** may be added on the map to identify important or relevant places or other information.

- The **map scale** may be provided to help the user measure distances and compare different maps.

- **A footnote** may be used to provide definitions or other methodological information.

- The **data source** should be identified at the bottom of the map.

- The **copyright information** should identify the author responsible for its content at the bottom of the map.

Other components may be included in some maps, but they are not essential:

- A **north arrow** is only needed when the map is not orientated to the north.

- **Latitudes and longitudes** are only needed on world or continental maps.

- A **location map** is a small replica of the base map that sets the mapped area in its wider context. It may be useful if your audience is not familiar with the geography of the area.

- **Charts** may be added if they enhance the understanding of the map.

Use only key words in title and legends

Although maps communicate a visual message, the associated text lines are also important. The wording of the title and any legend should be considered carefully, as it determines the user's understanding and interpretation of your map. Here are some guidelines for the usage of text in maps:

- Be accurate, but keep it simple.

- Use only key words and avoid repeating the same words in the title, legends or footnotes.

- Use neutral language.

- Avoid abbreviations and acronyms.

- Use smaller font for the legends than for the title and even smaller font for the footnotes, but ensure that all text lines are legible.

Design the legend carefully

The design of your legend must ensure correct understanding and interpretation of your map. Each map type requires a different type of legend. But there are a few basic rules for choropleth and proportional symbol maps:

- All class limits should be unambiguous: avoid ranges such as 100-200, 200-300, 300-400.

- There should be no gap between classes: avoid ranges such as 1.0-1.5, 2.0-2.5, 3.0-3.5.

- Areas for which data are not available should be identified.

- In a map representing more than one variable, the legend should be displayed in descending order of importance of the variable.

Colour: another important choice

Colour is one of the most powerful graphic features. Select with great care the colours you use in your map, as they can influence and mislead.

The choice of colour in a thematic map depends on the data and on the type of map. But three other aspects should also be considered. First, you should be aware of any existing convention associated with any given colour, as well as possible positive or negative connotations.

Then, you should make sure that everyone can understand your message with the colours used in your map. For example, colour-blind people have difficulty distinguishing between some colours. The most common case is red-green blindness. If you use red and green to show a difference between two types of areas, such as growth and decline, colour-blind people will not see it. There is an easy solution: these people will see the difference if you replace red with purple.

Finally, when there are relatively few classes of data for values on a continuous scale (e.g. population density), you should consider using different shades of the same colour rather than different colours. If you have data in discrete classes, or with positive and negative values, different colours are often more appropriate.

6. Emerging visualization techniques

6.1 Why visualization is more than just a picture

Emerging tools and techniques are providing new opportunities for visualizing data and making them more interesting to users. Dynamic table, chart and map generators allow users to manipulate data and create their own visualizations. Animation and video are engaging formats, somewhat like television. They do a good job of illustrating changes over time and include verbal or textual descriptions to explain the meaning behind the numbers. New types of visualizations are also emerging, such as sparklines and tag clouds (see section 6.4), providing alternative ways to illustrate information.

The latest web technologies, and the expectations they create amongst the user community, are changing the way statistical organizations communicate statistics. The Internet is now a two-way communication forum where users can share their own data visualizations and discuss their findings. Websites such as Many Eyes[20], Swivel[21] and Data Place[22] are examples of online communities that discuss and share data and graphics.

Whilst increasing user flexibility, the development of new visualization techniques and more interactive websites can also cause problems for statistical organizations. It is becoming increasingly easy for users, whether by accident or design, to distort or misrepresent statistics, and then make these distortions and misrepresentations widely available to others. It is therefore necessary for statistical organizations to have a clear policy on how they will apply and offer new visualization techniques.

This chapter provides an overview of these new visualization tools and techniques.

6.2 Dynamic visualizations

With the advent of the Internet and growth of Web 2.0 technologies[23], users can interact with data and create their own visualizations. Many statistical organizations now provide access to their databases through their websites, allowing users to query and download statistical information themselves. This functionality is increasingly being complemented by a suite of visualization tools that allow users to create tables, charts or maps online, without having to download the data and work in another application.

There are concerns about the consequences of giving this level of control to users. There is the possibility that they will create nonsensical graphics or derive inappropriate correlations. However, it is surely preferable that users are accessing and working with the data. Potential problems can be minimized by providing key metadata in a clear and obvious way, offering support to less experienced users, and by monitoring and correcting any misuse.

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[20] Many Eyes is a website where users can upload data, create charts and other visualizations and discuss their findings (see http://manyeyes.alphaworks.ibm.com/manyeyes/).
[21] Swivel offers similar functionality to Many Eyes (see www.swivel.com).
[22] Data Place is a website that provides users with statistics on cities, towns and states in the United States (see www.dataplace.org/).
[23] "Web 2.0" is a term to describe a new wave of internet technologies that allow users to do more than just access information online: they can add, change or influence web content. Examples include wikis, such as Wikipedia, blogs and social networking sites, such as Facebook or LinkedIn.

6.3   Animation and video

Animation and video are two important emerging data visualization techniques. When you consider the popularity of television and film, it is not surprising that users like the idea of receiving messages via moving pictures. This format makes it easier to tell the story, by combining audio or textual descriptions with graphical illustrations to communicate the meaning behind the numbers.

GOOD EXAMPLE of using animation to communicate statistics
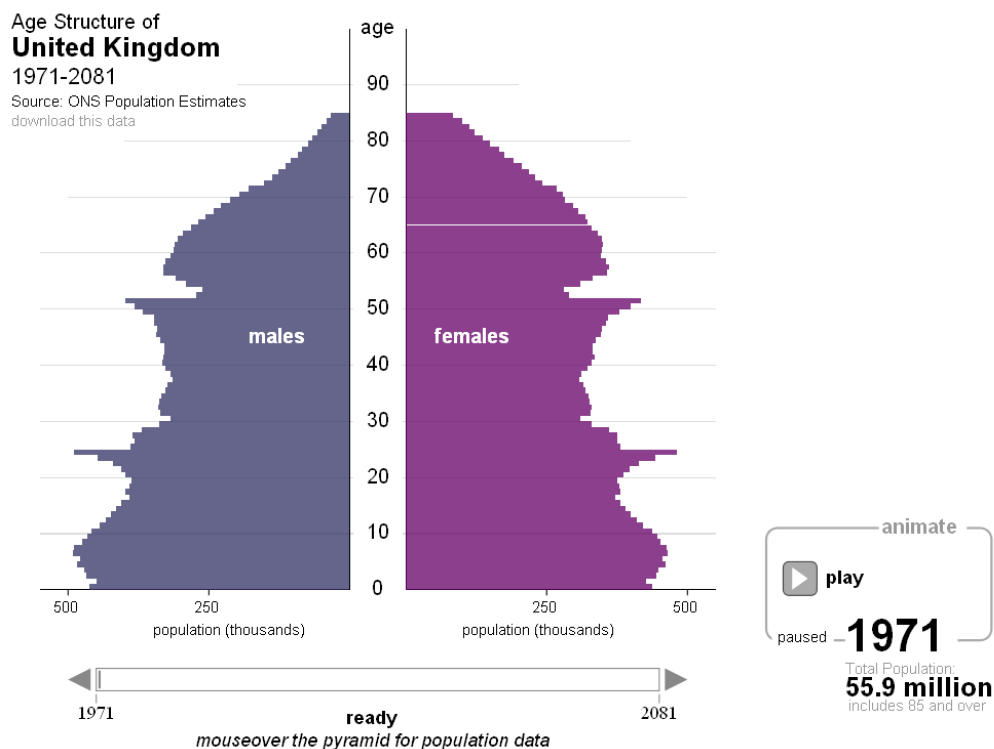
Source: Office for National Statistics, United Kingdom[24]

The dynamic population pyramids developed by several statistical organizations, including the UK Office for National Statistics and Statistics Canada, are good examples of combining animation with interactivity in a simple interface. Users can click on play to watch how the shape of the population pyramid changes over time. They can interact with the chart by selecting age groups and noting the detailed numbers and proportion of total population.

Hans Rosling, co-founder of Gapminder[25], has had great success with using animation to illustrate data, as a way of communicating statistics. Rosling has achieved a massive audience through online video, an increasingly popular feature of the Internet. His presentation at TED Conference[26] in 2006 has been viewed online and downloaded thousands of times. He has built upon the popularity of this medium for communicating statistics by developing "gapcasts", which are short video lectures on issues, such as maternal mortality, globalization, energy and human development trends.

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[24] http://www.statistics.gov.uk/populationestimates/svg_pyramid/uk/index.html
[25] http://www.gapminder.org/
[26] TED stands for Technology, Entertainment, Design. It is an annual conference that attracts leading people to speak on current issues in these fields. The presentations are published on their website at www.ted.com.

**GOOD EXAMPLE of combining animation and
new web technologies to communicate statistics**

Source: Gapminder[27]

6.4   Web 2.0 and building communities around data

Websites such as Many Eyes, Swivel and Data Place are adding a new dimension to visual presentations by building online communities around data visualization and sharing. These websites allow users to upload datasets and create graphics for sharing and discussion with other users. Other applications, often referred to as "mashups", combine data or functionalities from two or more sources to create a new service. An example of a mashup is the combination of statistical and cartographic data to create a geographic view of data[28].

Some producers of official statistics are experimenting with the potential of these Web services for communicating with a wider audience. For example, the UNECE has uploaded four datasets to Swivel, with mixed results. On the positive side, these datasets have each been viewed over 5 000 times during the first 18 months, indicating that the data have reached many users. However, they have only generated two user comments and the links to the UNECE statistical database website have only been followed 10 times during this period, so virtually no information has been gathered about these new users.

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[27] http://www.gapminder.org/video/gap-cast/
[28] For example, the latest versions of the PC-Axis suite of statistical dissemination software (http://www.pc-axis.scb.se/) provide the option to combine data with both Google Maps and Google Earth.

GOOD EXAMPLE of using the new Web services to reach wider audiences
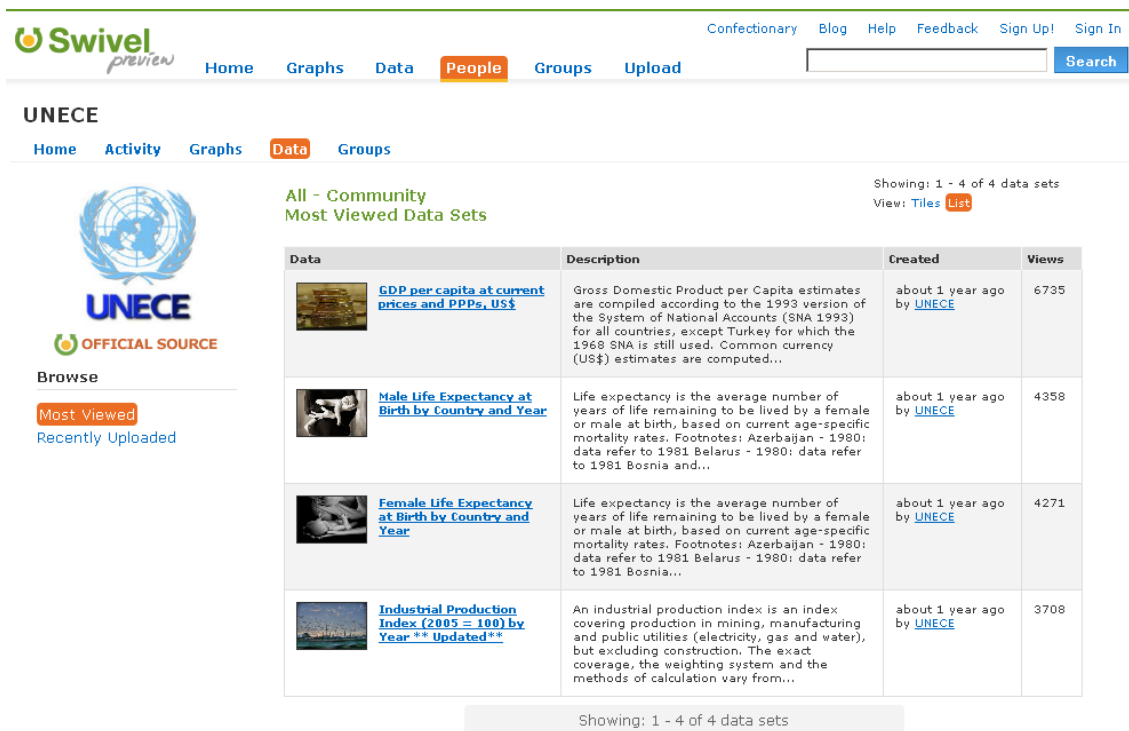
Source: Swivel[29]

Although success has been mixed so far, this sort of online community clearly provides a relatively easy way to reach additional users and is therefore an emerging area of data visualization worth following.[30]

6.5   Other new visualization techniques

Sparklines

Sparklines are small, word-sized line charts that show trends over time. They have the benefit of showing a great deal of information at a glance and can be placed alongside words that explain their meaning.

Tufte (2006) first proposed sparklines. The following example shows sparklines used to illustrate fluctuations in the Euro exchange rate against other currencies. These "intense, simple, word-sized graphics" enhance tabular data with a visual representation without taking up much space.

GOOD EXAMPLE of a sparkline

Source: Tufte, E.R. (2006), *Beautiful Evidence*, Cheshire CT, Graphics Press.

Tag clouds

A tag cloud (sometimes also called a word cloud) is a visual representation of the frequency of a word or tag in a particular text or dataset. Varying size and colours illustrate the popularity or importance of tags. They are often seen on websites as a list of categories, with each word being a clickable link that takes the user to more information relating to that word.

Tag clouds are a useful way to identify common terms in text and build keyword taxonomies. The example below has been created using the text from this chapter, clearly illustrating the key words.

GOOD EXAMPLE of a tag cloud

Created using Tag Cloud Builder[31]

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[31] http://tagcloud.oclc.org/tagcloud/TagCloudDemo

7. Accessibility issues

For basic statistical information to be broadly and easily used, it must be universally accessible. This means everyone must be able to consult and understand the information, regardless of the technology they use or any disabilities they may have. Therefore, an important goal of a communications strategy is to generate information that is accessible.

To attract and reach large audiences, the information should be presented in a structured and well organized way that meets established and generally recognized standards. Three partly overlapping aspects of accessibility are considered in this chapter:

- Providing suitable metadata to help users understand the data;

- Providing data in a range of formats, including via new media such as mobile phones or other hand-held devices;

- Ensuring the maximum accessibility to information for people with disabilities, often in compliance with specific legal or policy requirements.

Making statistical information accessible to everyone requires extra awareness, extra work and extra resources. However, the principle of equal access to basic statistical information is an important one. A well thought-out accessibility strategy will benefit everyone.

In this chapter, we discuss the main components of good information that should be considered when communicating statistical information.

7.1   Text

Text must be concise, coherent and well-structured so users can easily find the information they are looking for. Presenting your text in distinct, logical sections with headings and subheadings will make searching it and converting it to other formats easier.

To serve all target groups effectively, text should be available in multiple formats, e.g. Braille, audio or oversized letters. When creating the original text, you should anticipate possible format conversions to minimize their impact. For example, adding a text description for each piece of graphic information will reduce the task of converting it to Braille, audio or even HTML[32] format for a website.

Accessibility rules developed by the international World Wide Web Consortium (W3C)[33] were designed to ensure access to information in electronic format using adaptive technologies. These include screen readers, character enlargement systems and portable data access devices (PDA), to name but a few.

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[32] Hyper Text Mark-up Language.
[33] http://www.w3.org/

7.2 Tables

You should also pay attention to accessibility when using tables to present your data. If the data are displayed without all the information needed to understand and interpret them, they are unusable or misleading.

Consider, for example, a table spread over several pages. If the column headers or row stubs are no longer visible, the user will hardly be able to read the table. It is therefore important to repeat the column headers and row stubs on each new page.

GOOD EXAMPLE of a table that meets accessibility requirements

Livestock inventory in Canada, 2007 and 2008

Type of livestock	2007		2008	
	Thousands of head	%	Thousands of head	%
Cattle	15 885	50.2	15 195	52.0
Hogs	14 690	46.4	12 985	44.4
Sheep	1 096	3.5	1 062	3.6
TOTAL	31 671	100	29 242	100

Source: Canadian Cattle Statistics August 2008[34]

Each value is not only associated with a type of livestock and a year, but it also refers either to the number of head (in thousands) or the percentage. A screen reader must be able to give all this information for each value in the table. Users would therefore hear: "In 2007, the percentage of cattle is 50.2".

In electronic format such as HTML, tags can be included for column headers and row stubs, along with a short description of their content when necessary. Using tags is good for everyone. When tables are downloaded, the column headers and row stubs are transferred directly, avoiding confusion. Moreover, when the structure of your table is complex, it is important to describe precisely how the data are organized so users can get the maximum information with a minimum of effort.

7.3 Charts

When producing charts, it is worth considering that not all users have access to pictures. A text description can be created to provide the same information as displayed in your chart. Below is an example from the National Braille Association Tape Recording Manual.

On a website, the use of an "alt text" tag (a brief text equivalent) or a "longdesc" attribute (a long description stored on a different page and accessible through an e-mail address) are techniques recognized and described by W3C. These descriptions may also be used in the production of documents in audio, Braille or other formats.

You may have so many charts that you have difficulty producing a text equivalent manually. Projects are underway to design tools that will be able to automatically extract information from a chart. They will also be able to generate a descriptive page at the same time as the chart is created.

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[34] http://www.thedairysite.com/articles/1613/canadian-cattle-statistics-august-2008

GOOD EXAMPLE of a chart with a text equivalent

Relationship between the vapor pressure of water and its temperature

Pressure
(millimeters
of mercury)

Temperature
(degrees centigrade)
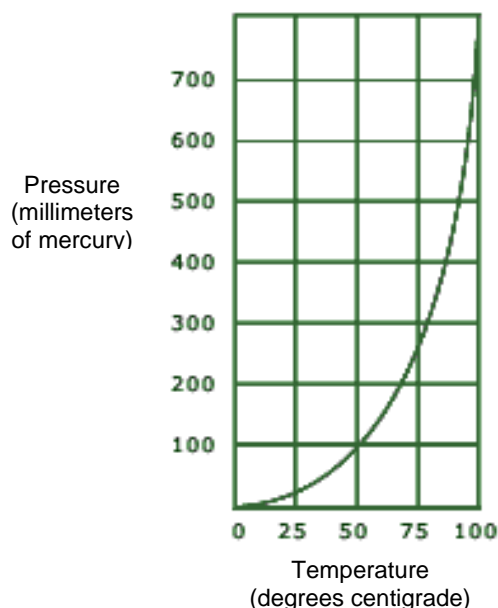
> "The relationship between the vapor pressure of water and its temperature." This is a line graph whose x-axis is temperature in degrees centigrade, running from zero to one hundred degrees. The y-axis is pressure in millimeters of mercury and runs from zero to 800 millimeters. The curve starts at the origin and rises so that when x is 25 degrees, y is approximately 40 millimeters. When x is 50, y is 100. When x is 75, y is just under 300. When x is 100, y is about 760."

Source: Accessible Digital Media: Design Guidelines for Electronic Publications, Multimedia and the Web[35].

7.4   Maps

Maps constitute major technical challenges in terms of accessibility for people with certain disabilities. Information is transmitted by a combination of images and colours, two methods virtually incompatible with accessibility standards. We should therefore consider offering a text alternative to provide the same information as represented in the map and/or give access to the data tables.

Another option is to provide a search tool that would let users select parameters, such as an area, a town or a street. A database search could be something like this: "Search the number of male individuals aged 15 to 49 living in a specific area and working in the agro-industry sector". The results should be generated in the form of a statistical table providing the same information as shown visually.

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[35] http://ncam.wgbh.org/publications/adm/guideline_f.html

GOOD EXAMPLE of a map accessible to blind people

Braille map of a portion of Washington DC
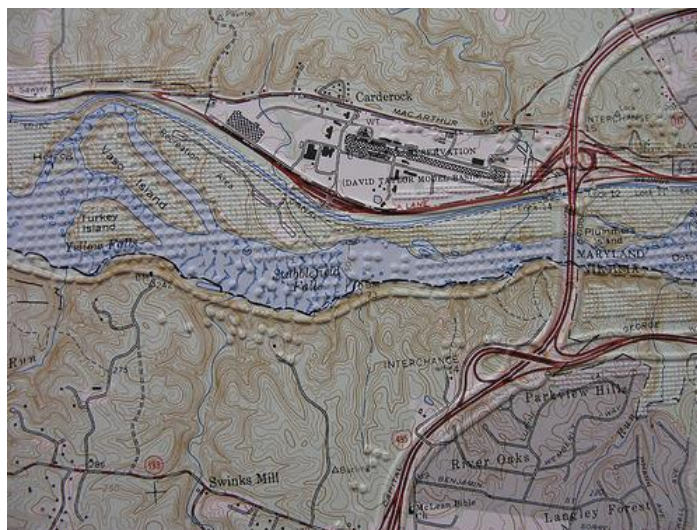
Source: US Geological Survey Library, courtesy of Flickr[36]

7.5   Metadata

Statistical organizations should ensure that users are provided with the metadata they need to understand the data, including their strengths and limitations. These metadata must be kept up-to-date by incorporating the latest changes in definitions, classifications and methodology.

You should consider the following recommendations[37] to ensure that your metadata can be accessed and used by everyone:

- Provide access to the metadata via a range of different media, such as paper publications, CD-ROMs, etc. All metadata should be available on the Internet, as it is the most accessible medium for users to find the most up-to-date metadata.

- Present the metadata in such a way as to meet the needs of a range of users with different requirements and/or statistical expertise.

- Disseminate the metadata free of charge on the Internet, even if there is a charge for paper versions or for the statistics they describe.

- Ensure active linkage of the metadata to the tables and charts they describe - and vice versa.

- Make metadata available not only in the national language but also, if possible, in a common language such as English.

- Provide a local search engine based on free text search.

- Implement a mechanism to ensure the stability of URLs (Uniform Resource Locators) or providing links between the old and new URLs that will redirect users to the new address. This is a key issue given the importance of links between websites.

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[36] http://www.flickr.com/photos/98169608@N00/3296197787/
[37] The guidelines for the reporting and dissemination of metadata are adapted from those included in the 2007 OECD publication "Data and Metadata Reporting and Presentation Handbook", available at http://www.oecd.org/bookshop?9789264030329.

- Provide the names of contact persons or email addresses where further information about concepts, definitions and statistical methodologies may be obtained. In some organizations, the "contact" would be a generic corporate contact point or referral service for all client enquiries.

Some statistical organizations present metadata as layers of a pyramid. With this approach, metadata become more detailed as the user moves down from the top of the pyramid:

- **At the top of the pyramid:** metadata that are essential for a basic understanding of the statistics, including information on the status of the data (preliminary or final). Casual users will rarely go beyond this type of metadata.

- **Below:** explanatory notes that provide a brief description of the statistics (definitions, key issues, limitations, etc.) that can impact the use of the data. Intermediate users may consult this type of metadata.

- **At the base of the pyramid:** the most detailed methodological information, typically in the form of methodological manuals or similar documents. This type of metadata is likely to be of interest only to the most experienced users and those using the data for detailed research.

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Further useful information and discussion on the presentation of statistics can be found at: http://blogstats.wordpress.com/.

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

Making Data Meaningful

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Part 3

A guide to communicating
with the media
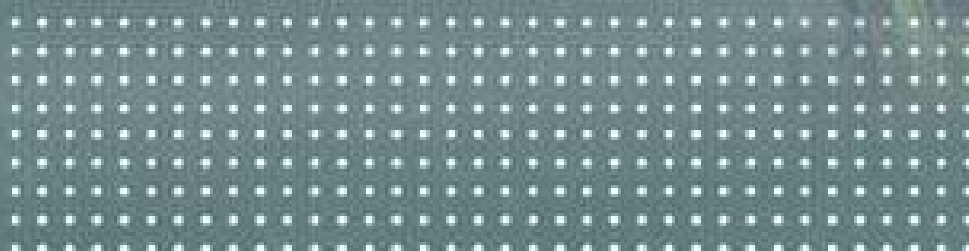
UNITED
NATIONS

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

Making Data Meaningful

Part 3:

A guide to communicating with the media

UNITED NATIONS
Geneva, 2011

NOTE

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Table of Contents

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Introduction

Making Data Meaningful Part 3: A guide to communicating with the media is intended as a practical tool for managers, statisticians, and communication and media relations officers in statistical organizations, particularly those organizations that are in the process of developing their communication strategies. This guide aims to help producers of statistics find the best way to get their message across and to communicate effectively with the media. It contains suggestions, guidelines and examples—but not strict rules or rigid templates.

The *Making Data Meaningful* guides[1] have been prepared within the framework of the United Nations Economic Commission for Europe (UNECE) Work Sessions on the Communication of Statistics[2], under the programme of work of the Conference of European Statisticians[3]. The first two guides are:

- *Making Data Meaningful Part 1: A guide to writing stories about numbers* (first published in 2006)

- *Making Data Meaningful Part 2: A guide to presenting statistics* (2009)

The first edition of *Communicating with the Media: A guide for statistical organizations* was published in 2004. The Internet was not new at that point, but its impact on information dissemination was not as pervasive as it is now. Social media were just beginning to emerge.

This new edition reflects the increasing impact of the Internet and social media, including Facebook, Twitter and blogs. These topics are now covered in more depth and across the various aspects of media relations, rather than in one isolated chapter. New discussions include the integration of social media with broadcast and print media, measuring the impact of social media and online press rooms.

The guide recognizes that there are many practical and cultural differences among statistical organizations and that approaches may vary from country to country.

A group of experts in the communication of statistics prepared this guide. They are (in alphabetical order):
- Colleen Blessing, United States Energy Information Administration
- Frances Comerford, Central Statistical Office of Ireland
- Megan Cox, United States National Center for Health Statistics
- Marc Debusschere, Eurostat (statistical office of the European Union)
- Joanne Dickinson, United States Census Bureau
- Ellen Dougherty, United States National Agricultural Statistics Service
- John Flanders, Statistics Canada

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[1] These guides can be downloaded from http://www.unece.org/stats/documents/writing/
[2] Information about the UNECE Work Sessions on the Communication of Statistics is available from the UNECE website at http://www.unece.org/stats/archive/04.05.e.htm.
[3] Information about the Conference of European Statisticians is available from the UNECE website at http://www.unece.org/stats/archive/act.00.e.htm.

1. Principles, objectives and management issues

As a rule, it's fair to say that journalists and statisticians have little in common. Yet, journalists and national statistical organizations are virtually inseparable. Why? Because the general public is an important audience for the statistical organizations, and the news media are powerful tools for reaching this audience.

The challenge for a national statistical organization (NSO) is to help journalists understand the data. Tell them a story. Tell them about the world they live in. Tell them how their numbers help the public understand what they see around them as they drive to work every morning and watch the news on television every night.

1.1   Principles of dissemination

Dissemination of statistical information to the media is based on the same core principles that underlie the general dissemination activities of the NSO.

Relevance: The information should be relevant to the social, economic and general conditions of the country and meet the needs of both public and private decision makers. For the media, relevance translates into newsworthiness. However, the statistical organization must be careful to present information in a way that does not trivialize the data or findings. The goal is to inform citizens about the availability of the data or information. Media coverage is desirable because it enlarges the audience for the message and will increase knowledge and stimulate debate among the broader public.

Confidentiality: The NSO must protect the confidentiality of individual respondents, whether persons or businesses, for all data collected. The organization should not release any information that identifies an individual or group without prior consent. Nor must the organization reveal information that undermines the confidentiality of its respondents. This restriction applies to the media the same way it does to any other customer of the organization.

Independence and objectivity: Information should be presented in an objective and impartial manner, and be independent of political control or influence. The Fundamental Principles of Official Statistics[4] set criteria by which independence and objectivity can be judged.

Timeliness: Information should be current and released as soon as possible after the reference period. The timeliness of information will influence its relevance.

Accessibility and clarity: In principle, all users should have equal access to data as well as to metadata (though see also the discussion on pre-release practices in section 1.4 below). Information should be publicly available in appropriate formats through appropriate delivery channels, and be written in plain and understandable language adapted to the level of understanding of the main user groups. The statistical organization should ensure that the media, like other clients, are able to access and

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[4] See http://www.unece.org/stats/archive/docs.fp.e.htm

correctly interpret information on statistical methods, concepts, variables and classifications used in producing statistical results.

Coherence: The use of standard concepts, classifications and target populations promotes coherence and credibility of statistical information, as does the use of common methodology across surveys.

Adherence to these core dissemination principles will enhance the credibility of the NSO and build public trust in the reliability of its information.

1.2   Objectives of dissemination

Increasingly, organizations and individuals recognize the importance of using statistical findings to make evidence-based decisions. For many citizens, the news media provide their only exposure to official statistics. Therefore, it is critical that the statistical organization communicates effectively with the media to achieve three important dissemination objectives:

- To inform the general public about the latest releases of official statistics and reports on the social, economic and general conditions of the country.
- To demonstrate the relevance of statistical information to both the general public and to public and private-sector organizations and businesses to inform decision-making throughout society more effectively.
- To increase public awareness of and support for statistical programmes and services.

The extent to which the NSO can communicate effectively with and through the media has a large impact on how well it can achieve these objectives. Thus, it is in the best interest of the NSO to build a strong working relationship with the media, to make it easy for journalists to report on statistical information in an accurate, timely and informative manner, and to take steps to increase media coverage as a way of reaching the broader society with important statistical information.

1.3   Understanding the media

To communicate effectively with the media, NSOs must understand their media community. This understanding calls for an awareness of the types of media in the country, the needs of these media and their coverage area, so that the NSO can provide customized services that meet their various information needs.

The media use many vehicles to reach their audiences, including newspapers, magazines and other periodicals, as well as radio, television and the Internet. While television and the Internet remain the primary news sources for citizens of industrialized countries, newspapers and other printed media can provide more detailed coverage of statistical information.

The key to building a strong working relationship with the media is to understand who they are and how best to meet their information needs in a manner that is both proactive and user-friendly. This relationship includes an obligation to communicate effectively by providing information that is clear, relevant, objective, easy to

understand and useful. A good measure of success lies in the extent to which different news media use the information releases from the statistical organization, the accuracy with which the information is reported and the trust explicitly or implicitly communicated along with the information.

1.4   Management issues

The management of NSOs should consider a number of issues related to the dissemination of information to the media. It might be preferable to develop policies on many of these issues.

Allocating resources: The NSO should first decide how much it wants to invest in media relations. The statistical organization is only as relevant as the extent to which its information is known and used across society, so investing in media relations is fundamentally important to the success of the statistical organization.

Pre-release of data: The NSO may wish to develop a policy concerning the electronic pre-release of statistical data to the media under embargo (see chapter 5). This system provides an opportunity for journalists to digest the information at dispersed locations and build their storyline before the data are officially released to the public. However, a pre-release also places the integrity of the NSO at risk if the embargo is not honoured and creates a potential risk of inequitable access to information.

An alternative to the embargo system is the media lock-up. Under this system, members of the media are physically "confined" to a media room for a certain period of time to give them an advanced look at the news releases and let them prepare their stories for transmission precisely at release time. While the lock-up reduces the risk of unauthorized pre-release, accessibility is limited to journalists working near the NSO.

Not all statistical organizations pre-release their data. Some organizations, either for logistical, security, or other reasons, release their data to everyone at the same time. A media advisory notice sent to the media in advance of the release could put reporters on the alert.

Media monitoring and response to erroneous statements: The NSO should consider establishing a system to monitor the news media that serve them regularly. A fundamental step in this monitoring is to measure how extensively the media cover the releases of statistical information and how accurately the information is reported.

In instances where journalists misinterpret or erroneously report the data, the NSO can request a correction in the media, either informally or formally. This process of monitoring and correcting ensures that the public is not misled by the erroneous report, and protects the NSO's reputation for accuracy and reliability.

Media relations and official spokespersons: Members of the media frequently call the NSO seeking information to help them prepare their articles. NSOs may wish to prepare a set of policies and procedures concerning media requests for interviews, providing comments on programme issues and data interpretation. The NSO can provide a list of media spokespersons or designated experts on topical subjects who are directly accessible to journalists, particularly when new statistical information is released.

While collaboration between subject-matter experts and journalists can result in enhanced media coverage, difficulties can arise when statistical experts deal with journalists, who are in most cases generalists. To ensure standard messages for media consumption that do not contain confusing information or unnecessary detail, it is important that the spokespersons receive media training. This training should also cover the policy of the organisation on equal treatment of users and the principles of statistical independence.

Fees and charges for products and services: In most cases, NSOs provide all but very specialized statistical information free of charge. When fees are necessary, however, recognition of the special role of the media as gatekeepers to the public, coupled with the diminishing marginal cost of Internet dissemination, argues for exempting the media from those fees in the interest of broader dissemination of statistical results.

Government authorities: The pre-release of statistical data to government authorities may give rise, justifiably or not, to media allegations of censorship, tampering with or suppression of data. This can undermine public trust in the objectivity of the data released by the NSO. The pre-release of data to government authorities should be carefully managed with a clear policy detailing how pre-release of data is to be handled.

2. Organizational aspects

2.1   Introduction

This chapter deals with the organizational aspects of statistical cooperation with the news media: the structures and staffing that should be in place to optimize a statistical organization's communication and cooperation with the media. This organizational perspective is distinguished from two other perspectives: the managerial or policy perspective and the operational perspective.

The managerial or policy perspective is about strategic decisions, usually made by general management or political authorities, regarding the broader orientations of communication policy and relationships with the media. These aspects have been discussed in chapter 1.

The operational perspective addresses the concrete procedures that are developed and implemented in order to communicate on a day-to-day basis. Operational aspects are discussed in later chapters.

Chapter 2, therefore, is not about why some things should be done, but about creating the structures and instruments that make it possible to do them. Because some topics may be considered not only from an organizational point-of-view but also from a policy or an operational one, they are also addressed in other chapters.

Recent technological changes have had a significant impact on the way statistical organizations communicate with the media. In this era of instantaneous, interactive communication, expectations have been raised. The media are demanding more information, more rapidly. At the same time, monitoring the media and how they use the statistical information has become more important—and more challenging—for statistical organizations.

In the area of cooperating with the media, it sometimes makes sense to outsource or subcontract a specific job to someone who has the necessary expertise or who can do it in a more cost-effective manner. This topic will be addressed later in this chapter. But outsourcing, of course, does not mean that the work can be handed out and then forgotten. Outsourced jobs have to be closely watched before, during and after their execution.

2.2   Gearing the organization for "outgoing" media work

Most of a statistical organization's media coverage will likely be the result of the organization's "outgoing" media work—that is, its proactive efforts to package and distribute statistical data in a way that is appealing, understandable and useful to the media. This dissemination of useful information should be a primary aim of any statistical organization's media strategy.

A precondition for efficient media work is a professional communication unit in the organization. Having a centralized unit by no means implies that all the work should be done by that group, but it implies that the communication unit should have the central

responsibility for planning, developing and controlling the quality, timing, and priority of the outgoing media work.

The communication unit should include staff with an academic background in journalism and communication. It is advisable to employ at least some staff with direct experience working in the media, as these individuals will have first-hand knowledge of the way journalists think and work. To maintain and further develop competencies in this area, staff members should cultivate close ties to the media world not only by regularly handling incoming media inquiries, but ideally also through regular outreach and interaction with the media. These relationships could be developed through such activities as membership and involvement in professional media organizations, periodic informal conversations with reporters, and through study visits to real-time newsrooms.

Even if you have communications staff with skill and experience in media work, statistical staff throughout the organization still need at least some basic knowledge and training in media relations. This knowledge can be achieved in different ways. One good practice is to take new staff through an introductory course on working with the media (see chapter 7), particularly if they are going to write about statistics for the media or answer questions from journalists. This training could be an internal course, but you could also use instructors from the "real" media world. More seasoned staff could also benefit from refresher courses in media relations, and senior management should be thoroughly trained in interviewing techniques.

Most statistical material developed for the media should be produced in close cooperation between subject-matter and communication specialists. It is necessary that management actively supports this cooperation, stressing the importance of both statistical and communication skills in the process. Otherwise the communication unit—being a relatively small part of the organization—will have difficulty in getting its message across.

Draft news releases on new statistics could be written both by subject-matter and communication experts, but should conclude with a dialogue between both units. The communications team may be more skilled in writing in plain language and pulling out the important points for the user. If the statistics in question are not produced with the user in mind, the results risk becoming dull, too long and detailed, and possibly even irrelevant. Rewriting a news release afterwards is time-consuming and unnecessary work.

One important way of keeping the statistical staff attentive to media needs is to collect and disseminate feedback on the performance of "their" statistics in the media. Did the news release or other publication get any attention—and how much? What angle—if any—did the media choose compared to the angle chosen by the subject-matter division? Read more in chapter 6 on media monitoring.

Some of a statistical organization's initiatives may necessitate media campaigns of a size that requires careful advanced planning and additional skill, expertise or staff resources that are not readily available within the organization. In such cases, the organization may consider outsourcing work to a communications or public relations agency.

Outsourcing communication work may be particularly beneficial for undertakings such as a census, where active support in the media can make a big difference to the outcome. Internally, the organization should set up cross-departmental working groups at an early stage to plan and effectively execute a comprehensive outreach campaign and to provide clear guidance to any outside consultants. The organization must also have staff dedicated to facilitating the relationship between the outside contractor and internal personnel, monitoring performance and maintaining tight control of budgets and plans. Ideally, the contractor should be a partner in the initiative, essentially functioning as an extension of the staff, enabling the organization to do more, and be more effective than it could be on its own.

2.3 Gearing the organization for handling "incoming" media enquiries

It is in the interest of both the media and the statistical organization that the media be able to access statistical data themselves. Otherwise, the organization will spend too much time serving the media, and the media will spend too much time trying to contact the statistical organization, in particular outside office hours.

The basic question within this context is: What "statistical needs" do the media have? Among the most frequent are:

- Finding out whether data are (or are not) available.
- Finding out when new data will be published.
- Finding news releases on published data.
- Finding other relevant publications, summaries, written comments, etc.
- Finding "raw" data in output databases.
- Obtaining metadata.
- Getting confirmation that data have been correctly interpreted.
- Obtaining a quote for the organization for their story.
- Finding a spokesperson.

Most, if not all, of these needs should be addressed on an organization's website, but the organization must be prepared to respond to e-mail, mail and telephone requests as well. The best practice is to set up a specific "press room" as part of your website, providing the services and information required by the media, as well as a list of persons to contact in and outside office hours (see chapters 4 and 5).

An advance release calendar on your website is a necessity for the media, as well as for the credibility of your organization. The release calendar could extend as far as one year ahead, but the next three months are the most important to the media. All statistical releases should be listed on the release calendar, but generally the most important to the media are the short-term economic indicators. It is vitally important to your organization's credibility that you adhere to announced release dates, and clearly explain the reason if it is necessary to make an exception and deviate from a pre-published date.

All your news releases and all your publications should be available to the media for free, preferably on your website. If this is not possible, provide contact details for ordering the publications in paper or web format.

A user-friendly database with all or most of your output data is of great benefit to the media. When reporters call with statistical requests, you should make a habit of guiding them to and through this database. Over time, they will learn to help themselves—even outside your normal office hours—and to locate useful data above and beyond what they were originally looking for.

Your news releases and other publications should contain all the metadata necessary for the media to understand the content. More detailed metadata should be made available from links in the data releases. It should be possible, nonetheless, for the journalists to get in contact with staff in the subject-matter division who are able to explain and clarify the data and the metadata.

As a general rule, journalists prefer to talk to the staff members directly responsible for the statistics in question. Hence, one best practice today is to provide contact data—e-mail and phone—of these persons in all news releases, database tables, etc. It may sometimes be preferable, however, to list a contact within the communications unit who can provide the media with basic information and screen any media requests. This will ensure that they are routed to the proper subject-matter expert and that the expert has the necessary information at hand to address the reporter's specific questions.

An alternative could be to have a call centre that handles incoming phone, e-mail and mail enquiries—both from the media and from other data users. But with a call centre it may be difficult to ensure that staff have sufficient hands-on experience with individual statistics. And often these staff members will have to check with the subject-matter division and call back instead of answering immediately.

A precondition for letting the subject-matter divisions handle incoming media calls is that they are educated to the task through sufficient media relations training (see chapter 7). Such training should prepare them to handle routine enquiries and to know when to pass more difficult or sensitive questions on to formal spokespersons or superiors.

2.4   Putting the results of media work back into the organization

Systematic media monitoring is a necessity for statistical organizations acting in a rapidly changing environment. We will be looking at the tools and methods for this in chapter 6, but mention a few organizational aspects here.

First, an organization must be prepared to allocate money and resources for this task. Media monitoring is a job that lends itself well to outsourcing. Most countries today have professional media monitoring services that can do the job much faster and cheaper than you could yourself. Remember, media monitoring today is a 24/7 task that requires staff around the clock to do the job properly. Some governments have set up a joint monitoring system for all government agencies but, even then, some of the work is often subcontracted.

One purpose of media monitoring is to be able to react to problems such as errors or misinterpretations in your media coverage. As monitoring can be costly, you have to balance your need for a fast reaction against the costs. But remember that a fast reaction saves you resources in the long run by immediately stopping the spread of errors or misinterpretations.

The responsibility for reacting to problems in the media has to be clearly assigned within the organization, most naturally to the communication unit. The communication unit, of course, has to rely on the subject-matter experts to identify and address errors and misinterpretations. Hence, good internal communication channels must be in place. There must also be internal channels to inform the organization when and how the problems have been resolved. Such information about recent media coverage could be communicated in a regular overview report, a staff e-mail, or the employee newsletter.

The topics of negative press coverage and how to handle a real media crisis are treated in-depth in chapter 8. Internally, the division of responsibility should be different when dealing with the different levels of media mishaps, from honest mistakes to real antagonism or a hidden agenda. Routine problems should be handled by the communication division with subsequent reporting back to the management. More serious problems must involve top management and maybe even politicians.

3. Emerging technologies for communicating with the media

3.1   From radio, television, and magazine news to social media and crowdsourcing

Today, we live in a world of converging media where all modes of communication and information are continually changing the way mass media and consumers—print producers and readers, radio broadcasters and listeners, TV broadcasters and viewers, social media channels, and computer applications and users of applications—create, consume, learn about, and interact with each other and information resources.

Over the last decade, effective communication has shifted from top-down to bottom-up. That is, listeners, viewers and readers of the former traditional media are now choosing how, where, at what time, and in what amounts they wish to consume information.

With the spread of the Internet and mobile communications, people now have the means to create and distribute their own messages or "viralize" (redistribute on-line) messages from others. Today, people are more likely to trust themselves, their families, and their communities for information than traditional news outlets.

People also are finding it hard to keep up with the pandemic of information that reaches them through a multitude of sources. It's no longer a case of staying up for your local evening news to watch the segment you are most interested in. People multitask at all hours—watching TV, listening to music or podcasts, doing homework while texting on their phones, reading their e-mail or posts on Facebook or some other networking channel.

Today, people are picking and choosing the types and kinds of information that they want to receive. They are subscribing to blogs rather than newspapers, browsing and filtering YouTube videos rather than reading magazines, or reading RSS feeds that they have subscribed to, to stay abreast of the world's happenings and their favourite pastimes and interests. Research shows that traditional journalism is shifting from "news round the clock" to "as it happens news." This change is largely the result of the proliferation of social media. In fact, the New York Times now has a "social media editor" to oversee their social media strategy. Renowned journalism schools have added social media to their requirements. And, many statistical organizations are exploring and creating social media channels and training staff to communicate in this new area.

3.2   What are social media?

Today's world is about do-it-yourself information and community-based communications and collaboration. Web 2.0 is a category of Internet tools and technologies created around the idea that people who consume media, access the Internet, and use the web no longer passively and absorb everything that is available. Social media are changing the way people communicate and connect effectively with

others online. Social media tools allow users to get involved, to create, to share their own content, and to design their own user experiences.

Web 2.0's dynamic social media tools, as compared to Web 1.0's static content pages, have been woven into the very fabric of the way content is consumed and websites operate. Well-developed social media tools can help the media more easily access, understand, and use data to complete their work.

Social media applications have quickly become part of the Internet mainstream. As individuals become increasingly accustomed to the interactive experiences of using social media in their personal and professional lives, they come to expect the ability to define their own web experience in all of their Internet activities. Measured against that expectation, users' satisfaction with traditional, static websites will most certainly decline. There is a growing expectation for statistical organizations to provide delivery options and customization that a website cannot provide on its own.

Social media tools for communication are widely used by businesses, governments, and individuals alike. The tools include:

- Interactive web journals or blogs (WordPress, Blogger, LiveJournal)
- Micro-blogs (Twitter, Tumblr, Blauk)
- Audio podcasts (iTunes, Podanza, Podcast)
- Images and photos (Flickr, Imgur, Panoramio)
- Videos (YouTube, Vimeo, Google Videos)
- Professional and personal networking sites for information sharing (Facebook[5], MySpace, LinkedIn)
- Wikis (collaborative authoring, i.e., Wikipedia).

Use of social media in the workplace has been especially beneficial in fostering increased collaboration. Various tools, including wikis, mashups and social bookmarking / tagging, applications have allowed users, both within and outside the workplace, to interact, pool resources and share expertise in new and dynamic ways.

"Mashups" combine data from numerous sources and present them in user-customizable interfaces. They have numerous uses, but are most frequently seen on Internet news websites, where data about events are overlaid on interactive map backgrounds. Statistical organizations must capitalize on these intensely popular social network media and technologies to work most effectively with the public and the media.

3.3 Opportunity and demand for use of social media

As a strategic asset, the Internet can help NSOs foster better communication with and interest from the media and the public about their programmes. By listening to what the media need, organizations can provide better media services and media offerings that focus on data users' most pressing demands for information.

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[5] Facebook currently has more than 500 million active users, over half of whom access their account at least once daily.

Deciding how to engage in a chaotic, social media-driven environment has become a hot topic. The challenge that faces NSOs is the pressure to proceed swiftly but cautiously into the realm of social media. An equally serious motivation is that organizations want to preserve trust and credibility with the public and the media.

While internal communication tools have certainly proven to be useful within the workplace, social media have excelled at facilitating increased external communication and information sharing. For example, there are currently 45 active blogs published by U.S. Federal agencies. The diversity of subjects covered by these blogs is testament to the power of the technology to provide a quick and easy way to disseminate information to targeted individuals, while providing simple mechanisms for simultaneously soliciting those individuals' comments and questions. Similarly, micro-blogs, like Twitter, have gained enormous popularity as mechanisms for publishing quick status updates, facts and commentary.

3.4 Balancing accuracy and quick access

NSOs must establish and maintain high credibility. Their information must be reliable and trustworthy. They must adhere to their published calendars for releases. They must ensure consistent messaging among spokespersons, staff, and information posted to blogs, wikis, RSS[6] feeds, etc. A high level of credibility will encourage journalists to use and even seek out information from the statistical organization.

The need to balance privacy, confidentiality and security creates an environment that can be at odds with the agile Web 2.0. Organizations must weigh their approaches of proceeding slowly and cautiously against the benefits of openness, timeliness and transparency when communicating with media, users, and advocates.

3.5 Not your father's newspaper: integrating social media with broadcast and print

The traditional way government organizations communicated with the media was through news or press releases or at special events such as news conferences. Reporters were handed printed statements and they would publish their articles from these materials within a day or two. Public information officers typically wrote these one-page articles with headlines to grab the attention of journalists and to fit into their readership's interests. The articles were presented in friendly language so that media and the public could easily understand them. Having ready-made articles made it easier for journalists to extract interesting and newsworthy information in a format that required little effort on their part.

In our era of electronic communication and social media, statistical organizations have a great deal to gain by reaching out to the media through a variety of channels.

Communicators in the media and statistical organizations are being forced to go where their consumers gather to get their messages to the people—this is the new bottom-up vs. top-down communications model. Consumers are "crowdsourcing"—looking to like-minded consumers who use social networking channels like Facebook, Twitter,

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[6] Really Simple Syndication – see the next page for more details.

Blogspots, YouTube, etc., to respond, react, share and provide feedback. As the model shifts from newspaper to blog, some considerations include:

- Outreach using social media requires strategic planning and full integration with marketing, communications, public and media relations, and preparing editorial calendars and promotional campaigns.

- Adding social media to this traditional mix requires research into social media activities, as well as successfully measured programmes and best practices.

- A strong partnership between information technology and communications areas helps define technological needs and communications requirements. This relationship ensures that online Web experiences will best engage participants within the social media culture and appropriately exploit new tools, technologies, and identify staff expertise requirements. Depending on your organization's level of commitment to social networking, you may want to include specialists and specialties like: advertising; public relations; partnership management; online, earned, and paid media; as well as experts in multicultural audiences, metrics, measurement and consumer research.

- Social media skills are especially important for public relations and media jobs. You cannot simply assign duties of social media to existing staff. Training, support, and planning are necessary here.

- Blogs require plain language, conversational writers, messaging approval processes, and fully trained and dedicated staff to adequately monitor and appropriately respond to comments.

- Consistent messaging across media must be monitored.

- Editorial and release calendars must be established and maintained.

In addition to the social media already mentioned, other channels include:

- **Syndication/RSS Feeds:** Syndication enables you to disseminate new information to the media without requiring reporters to visit your web page and without cluttering their in-boxes with e-mail updates. The latest news and information can be summarized in a standard XML format, called a "feed" or a "channel," which can be read from any Internet-connected device. Media subscribe to online content that interests them, in their preferred format and on their own schedule. The most common feed format is RSS, which means "Rich Site Summary" or "Really Simple Syndication."

- **WAP (Wireless Application Protocol):** Wireless Application Protocol empowers mobile users with wireless devices, including mobile phones, pagers and personal digital assistants (PDAs), to access information easily. Some statistical organizations use WAP to disseminate key economic indicators such as the Consumer Price Index, gross domestic product, retail sales index and unemployment rate.

- **SMS (Short Message Service):** Short Message Service allows users to send and receive text messages to and from mobile telephones. Some journalists at business newspapers have enquired about receiving key economic indicators by SMS to their cellular phone. However, so far no statistical organizations are disseminating facts and figures in this way.

- **Audio streaming/podcasting:** Audio news releases, interviews, commentary and public service announcements can be recorded in MP3 format and streamed from a website and/or distributed via podcast. The added advantage of podcasting is that it is a form of syndication (see above) and enables reporters and others to subscribe to and download to broadcasts automatically.

- **Video sharing:** YouTube has become the most popular video-sharing site and can be used to broadcast video news releases (VNRs), public service announcements, special event videos and other types of video productions.

3.6 Organizational hoops and hurdles

NSOs may come up against legal, cultural and/or technological barriers when attempting to reach out fully to the media and public and to collaborate on programmes via social media tools.

First and foremost, the terms of service from private sector vendors for many social media platforms are not appropriate for governmental organizations. As the need for these governmental organizations to maintain privacy, confidentiality, and the public's trust is of utmost importance, entering the sometimes unsure, chaotic world of social media requires a cultural change. Carefully thought-out policies and procedures must be created to provide rules of engagement and to maintain organizational needs and requirements.

Committing to and engaging in social media requires:

- Developing and presenting the business case.

- Getting commitment from senior management (partnering with senior management affords a wider perspective on organization operations and goals, and also of unidentified risks, ranging from perception to exposure or disclosure).

- Establishing a working group of internal stakeholders (the group of program areas who will benefit from increased media exposure can outline and coordinate required procedures and guidelines to achieve a corporate voice and to establish pilot projects for approval from senior management).

- Conducting pilot projects to measure success, risks, and resource requirements.

- Partnering Information Technology with the Communications department on matters of infrastructure and security has proven to be successful in achieving social media goals through a close, collaborative, web management relationship that aligns technology and branding.

3.7 Challenges of metrics and measurements

Many organizations are monitoring various types and forums of social networking to weigh the importance and use of social networking concepts on their websites for their targeted audiences and within the social media strata. While there is no exact science

to measure success in social media, a basic evaluation step is to benchmark your current level of activity. The following are some ways you can measure success:

- **Blogs:** Software applications can create reports to monitor and compare daily activities and messaging for statistical outputs to determine whether you need to adapt those outputs or the way they are communicated, and to learn how many bloggers quoted your articles or whether third-party spokespeople carried your messages to others.

- **YouTube:** Tracking and comparing posted videos from dates posted, dates first viewed and then regularly scheduled metrics of cumulative views through each video's life cycle. Comparing subjects, approaches, audiences, viewers' comments, ratings and favourites to quantify the value of the initiative helps you discover hot topics, needs and interests. These data provide guidance on how best to communicate with viewers.

- **Facebook:** Facebook provides a tool that allows you to keep a sum of total fans including new, removed, subscribed, unsubscribed and re-subscribed fans. You can also track the quality of posts; interactions per post and total interactions; viewers' likes, comments, wall posts, discussion posts; page views, unique page views; audio plays; video plays and photo views.

- **Twitter:** It includes tools that allow you to examine your impact via tweeting. TweetStats.com and TweetReach.com can show who is tweeting and re-tweeting your messages, the number of tweets you get during a day, and the times of day that people tweet. You can see the average number of replies to your tweets and whether tweets and re-tweets are generating calls to action.

In a further effort to determine the success of social media, some organizations have created enterprise dashboards to share metrics among programme managers and corporate leadership. For example, the U.S. Census Bureau's 2010 Census Integrated Communications Campaign used dashboard metrics to proactively refocus messaging, timing, calls to actions, and target topics and audiences.

Dashboard metrics can include comparisons of current "buzz" levels of activity, point to the data peaks and valleys in social media trendlines and look at social media activity using word clouds and rivers of news around emerging hot topics to learn specifically what might be happening in the world of social networking. Dashboard metrics can also help you compare current research findings like nightly polls around long-standing issues, perceptions and opinions of organizational programmes.

3.8   Summary

We need to proactively reach out to and disseminate easy-to-use, meaningful, topical and valued data to the media because their reach across multiple channels and audiences far exceeds that of most NSOs. Organizations should seek to learn more about and to effectively use twenty-first century communications channels, data visualizations and social media tools to engage and expand our audiences for statistics. By doing so, we can continue to serve as leading sources of quality data about the world's people and economies. In turn, journalists will be more likely to create meaningful and more accurate stories from the data we collect.

4. Using the web to communicate with the media

4.1 Communicating with expanded audiences and handling media requests

Expanded audience for statistical data

Prior to the Internet, most statistical organizations viewed their users as a small, elite group of experts with a high degree of interest in and knowledge of the data. In contrast, with the Internet, the customer base for statistical information has expanded so that anyone with a computer and an Internet connection can access this information online.

However, as a result of this widened availability of the data, many new users are not statistically literate or as familiar with the subject matter and technical language as the original customer base. This diverse range of users is forcing statistical organizations to be more user-focused rather than product-focused.

New role for the media in disseminating statistics

Now that the public can access information directly on the web, the role of the media in disseminating data has changed, although it is still important. Media professionals now play the intermediary role of transforming raw data into knowledge.

As well as interpreting data and writing articles in language the public can understand, journalists can point the public back to the original sources of the data if more detail is needed. Before the public had direct access to the data, users had to contact statistical organizations directly for data and interpretation. Such mediated access ensured that appropriate metadata, including the appropriate methodology, limitations, explanations and definitions, would accompany the statistics.

With the web, self-service access allows users to browse on their own, making the need for adequate, retrievable and understandable metadata even more important. Journalists and other users continue to contact the statistical organizations for help in interpreting the data.

The products are changing

The primary method for statistical organizations to provide data used to be printed publications. Some also provided data on tape and CD-ROM. Now the products can be electronic versions of paper documents, electronic-only documents, tables, databases, spreadsheets, and so on. The data may also be accessed and, in some cases, manipulated using a variety of web-based applications developed specifically for that purpose.

The focus is shifting from just providing numbers to providing words and text to explain the numbers, and more context and analysis of the numbers. Data are no longer enough: users want information. Some of the new products are, in fact, services, including web help and searchable databases.

Writing specifically for the web, rather than for print documents, and writing for all audiences, rather than just the subject matter experts, is becoming increasingly important in communicating with users. This style of writing requires different skills and approaches from writing for paper. Most analysts would much prefer to write a 20-page paper with all kinds of details than a two-page summary in plain language.

Some organizations charge for their products

For some statistical organizations, cost recovery is still important. When all data were available only in publications, or through special requests, it was far easier to know what to sell and how to set the price.

With the web, the pressure has been to provide more and more data free of charge, striking a balance between generating revenue and the public's right to information. Some organizations provide limited access to databases to paying subscribers. They perform special tabulations or do consulting on a fee basis, or they provide special services to paying subscribers. While news releases are generally available free of charge, the degree that web information is available without charge to journalists varies.

Getting credit for your data

Some international organizations have investigated methods of sharing data electronically, allowing others to display data directly from many statistical organizations. While this type of aggregation and access allows more people to find and compare data, one key consideration is the loss of the connection to the original data source.

Related issues involved in data sharing include:

- Presentation of the data is no longer controlled by the originating organization;
- Policies for attribution must be followed to ensure proper credit for the data, and to ensure accurate secondary sourcing.

Provision of metadata is even more critical because the user at that point will not be on the site of the original data provider, which might have had links to metadata. Metadata, the data about the data, are particularly important on the web.

Statistical organizations need to consider two types of metadata:

- Discovery metadata, which help users find what they are looking for.
- Interpretative metadata, which help users understand what they have found.

Discovery metadata might include indexes, site maps, and lists of terms (A to Z, glossaries). Frequently, technical terms and jargon are impediments to users who are unfamiliar with the subject. Interpretative metadata might include links to descriptive information, footnotes, and metadata repositories as companions to online databases.

4.2   Improving your website to best serve the media

Write in plain language

We want our users to understand our information. Our content must therefore be geared to people who are interested in statistics but who aren't statisticians, scientists, or subject-matter experts. Content written for the web, and employing the principles of plain language, includes:

- Language that people understand, not jargon and acronyms and technical terms.

- Short sentences and short paragraphs. The old adage that a paragraph should be 3-5 sentences is no longer true on the web. Forget the ancient guidance from your literature teacher!

- Headings and subheadings to help readers scan the content.

- Bulleted lists and bolded points to help readers see the main ideas.

- Active voice and direct sentences without lots of qualifiers and side thoughts.

- Consistent style so readers aren't distracted. Having a good web editorial style guide[7] helps reinforce your organization's writing policies and standards.

- Rounded numbers whenever possible. Readers don't need three decimal points to get the message.

- Access to definitions in a glossary and clear footnotes to explain more difficult concepts.

Use reverse pyramid writing

To communicate with journalists, statisticians need to write their stories the way journalists do. Journalists use the "inverted pyramid" style, where you write your conclusions at the top of the story and follow with secondary points.

Don't make the readers dig for the main story; they may never find it. A simple reminder is "Lead with the Lead." The phrase is to remind you not to lead with a long introduction or background statement or methodological assumptions. It is fine to revisit your original conclusion at the end of the story, if appropriate, but don't save the best information or conclusions for last.

Writing and organizing for the web vs. paper

Traditionally, statisticians wrote papers in a standard style, including some or all of the following: title page, table of contents, executive summary, introduction, and then the chapters. These sections would help the reader know what was included in the report and what each chapter is about (similar to a site map or jump links within reports now used on the web). This paper-oriented format does not work well on the web. Readers want to see links to topics, maybe a summary graphic, and key points right on the first page.

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[7] For example, the United States Energy Information Administration's Web Editorial Style Guide: http://tonto.eia.doe.gov/abouteia/pdfs/EIAWebEditorialStyleGuide.pdf.

Writing for the web does not mean posting a paper document on your website. It means rethinking how to structure and present the information so users can navigate through the report. Remember that readers cannot "thumb through" a website like they could a paper volume, so you need to give them a way to see the content up front.

Usability testing

How do you know if users are finding what they need on your site? Are they frustrated? Confused? The best way to find out is to actually watch users work on your site.

Feedback from users can be collected from usability tests, customer surveys, focus groups, and in-house helpline staff. A United Nations Economic Commission for Europe survey of websites from NSOs and international organizations found that most were aimed at a group of professional users and were designed accordingly. Very few had features especially designed for the casual or first-time user.

Good navigation (sections, links, resource ideas for the media)

Many NSOs are turning to database delivery of information to improve the usefulness of the information, to increase the timely availability of data and to save money. With the increased reliance on databases, the interfaces are critical to the success of the site. Users who are unsuccessful in using the databases may have to resort to contacting the NSOs directly, at a much greater cost.

If web development is distributed across the organization, the result can be inconsistent presentation and unconnected navigation, and even competing data access applications. Implementation of style standards assures consistent "look and feel" and avoids problems with presentation.

Some statistical organizations are using content management systems with fixed templates for efficient work and for the purpose of establishing corporate identity. Combining the standards with a web audit helps erase the differences by identifying what authors need to change.

Statistical organizations should consider strategies to ensure that people will find their site, including using keywords in the content of their web pages, encouraging links from other sites, improving marketing and paying search engines to ensure high rankings. Brochures and other handouts can be used to expand awareness of the site.

Data revisions and notifications

The ease and speed with which the content of websites can be revised has led to an increase in the number of revisions. A printed erratum is no longer needed to signal a change. Files can be updated and reloaded without the user ever knowing that a change has been made. While this is a great advantage to the statistical organization, the journalist may unknowingly present pre-revision data. A system of notification or labelling is therefore critical in the new web-based information environment.

Some statistical organizations require all material to be dated to allow for version control. Others indicate clearly that a revision has been made, and include the date and nature of the revision. Some organizations post their revision policies on the web.

As a statistical organization, you should have a policy concerning who can authorize changes, how they will be noted on the web, and what, if any, additional efforts will be made to notify users of the change. You should also consider under what circumstances a news release should be issued to signal a revision. News pages should show revisions to ensure that the news release data match any later revisions.

Some organizations have implemented subscription notification systems to advise users when there is an update to a particular set of statistics or data products.

Collecting feedback on your website from the media.

Statistical organizations want to know who is using their website and what is being accessed. Web logs record every transaction on the web server and are a rich source of information about activity on the site. Page views, file downloads and user sessions all measure user traffic.

Some sites may use registration to determine customer and media information. Web trends are useful in evaluating the architectural structure but only indirectly reflect on the usefulness of the content. Web logs cannot differentiate between journalists and other users.

Creators of websites may also want to know how satisfied users are with the website and what suggestions they have for improving the site. Some statistical organizations provide feedback forms and conduct surveys of web users to collect this information. These surveys can provide useful insights into any problems that may exist.

Other organizations register users to get access to statistic; although this process can drive away those users who do not want to register. Some organizations use commercial ratings and tracking programmes to assess satisfaction with their websites.

Most statistical organizations use feedback to determine what users are interested in and what kinds of information they need. This feedback can determine the type of products that are prepared and the mode of dissemination. Some organizations have created short presentations of information on topics of interest that are included on their home page.

Many use questions posed by users and answers provided by staff to create content. This dynamic application produces an FAQ ("frequently asked questions") section. Analysing the types of questions that people pose via telephone and e-mail can also identify areas for improvement.

4.3   Online Press Room

More and more NSOs are including a special section on their websites that is tailored primarily to the needs of the press. Journalists have come to expect to find media information in one place on an organization's website. This area should be given a

name that is easily recognizable to journalists such as Press, Press Room, Press Centre, or Newsroom and should be located just one click away from the homepage. Avoid calling this press section "News" because that label can be confused with new any other stories generated by your organization.

Suggested content for a Press Room

Your Press Room section must offer a simple way to contact the press relations department. Include at least one press relations contact name, phone number and e-mail address. This should ideally be the name and address of a person, not a generic inbox such as publicaffairs@statisticalagency.gov. Why? Journalists on deadline will not take a chance on sending a message to a generic e-mail address because they fear they will not receive a timely response.

When listing multiple press contacts, help people select the best contact by indicating the person's speciality or other differentiating characteristic. You should also let journalists know when they can expect to receive a response to their e-mails.

Include links to all relevant organizational information, such as:

- Organizational overview and background materials describing what you do and why: mission statement, fact sheets, history, and basics such as the number of employees and year established.

- Budget and other financial information.

- Titles, biographies and high-resolution photos of the senior management team.

- Key speeches, presentations or testimony (including video or audio of important speeches given by high-level executives if available).

- Organization or director's blog.

- The organization's strategic plan and annual report.

- Calendar or listing of forthcoming statistical releases or other key dates, to show what's on the horizon.

- Embargo policy.

- A directory of subject-matter experts so that journalists can contact the expert directly listing names, title, and a brief sentence or paragraph describing the specialization—e.g. earnings, population, etc..

- Publications listing or index.

- Frequently Asked Questions about the organization, its work, or on specific topics of interest.

- High-resolution, downloadable photos and graphics from your organization that are in the public domain and that you know are likely to be requested by the press and external audiences.

- Stock video clips (sometimes called b-roll), video news releases and radio sound-bites.

Making this information available in a single place on your site helps journalists build the foundation for their stories. Provide print-friendly versions of content people would

normally want to reference offline, such as annual reports, press releases, speeches, and executive bios.

How to feature press releases

Your press section should show the most recent press and news releases on its main page and include a link to a designated page or section for press releases. Label this area "Press Releases." Lists the most recent ones first. Archive all past press releases and make them sortable by date, with a separate listing by subject. Make it simple to search press releases and archived press releases independent of the rest of the site. All press releases (new and archived) should feature complete press contact information and dates. Finally, providing an e-mail distribution list and RSS feed for press releases has become a well-established feature.

Ideas to help the media

Highlight thought-provoking facts that journalists can use in their stories. Creative content and interesting facts pique journalists' interest reflect well on your organization. Journalists are usually under rigid deadlines, so it is helpful to provide them with electronic links from the press section or the press releases to related information.

Journalists often regard articles from independent newspapers and magazines as being more credible than an organization's own press releases and promotional materials. Many organizations are therefore now providing links to or information on what other media outlets have said about the organization.

It may be useful for your organization to create an online "Journalists' Guide to Using Official Statistics." If you have any complex recurring themes, such as economic recovery, you might consider asking someone (like a senior statistical economist) to write an article for the website press room explaining these issues.

If you are working with colleagues who can write well, get them to describe how their organization functions, what they do, how they do it, and why. This bridges the journalistic-corporate gap by getting some positive messages out there (together with some nice photos and good page layout). One idea might be features on "A Day in the Life of [fill in with subject-matter expert position]."

One simple technique that may reap great rewards is to establish and nurture relationships with the journalist(s) who most frequently feature your organization and data. Give the journalist a call when something out of the ordinary is about to be released.

Start building your press room

Talk with friendly journalists in order to understand what they need from you, and to find out how well these needs are being met by the website. Then, build their needs and requirements into your press section. Face-to-face meetings or focus groups with key journalists who frequently cover an organization or a particular dataset are other ways to determine the usefulness of your website.

Some best practice examples include:

- United States Department of Agriculture's Economic Research Service: http://www.ers.usda.gov/News/ and http://www.ers.usda.gov/News/ERSInTheNews.htm

- National Center for Health Statistics: http://www.cdc.gov/nchs/pressroom/

- Australian Bureau of Statistics in the news and in blogs: http://www.abs.gov.au/websitedbs/D3310114.nsf/home/news+&+media

- Office for National Statistics Frequently Asked Questions on Methodology Changes: http://www.statistics.gov.uk/downloads/theme_economy/FAQ.pdf

Finally, consider discussing your press room concepts and prototypes with the journalists themselves.

But keep in mind that some organizations have chosen other models that could also function well. For example, some make press releases available on their website to make it easier for the general public to access them.

4.4   Issues of changing skills to provide these services

Changing the skill mix to support the web

Statistical organizations need specific skills to support disseminating information on the web and to deal with the media. The shift to more visual data, including maps and animated longitudinal data, requires staff with geographic information systems and data visualization skills.

Changing the skill mix has obvious resource implications for an organization. And shift was not just technical. It was also psychological, requiring employees to be more flexible and to change their outlook from the old way of doing business. It has often been difficult to convince data producers to change their methods and orientation. Staff also had to understand new ways to write electronic news releases, create a press area or press room on the website, and to deal with the media's new access to all kinds of information.

It was originally believed that the web would provide self-service for users, and that telephone and e-mail support would be minimal. In fact, most organizations have been surprised to find that the number of enquiries have in fact increased with the availability of information on the web.

Huge increases in the numbers of users translate into many more questions and comments. Customer service staff are having to be retrained to answer e-mail questions or to provide help on the telephone to the media and other users. Press offices also have to learn new technology and dissemination methods to work with the media.

5. Writing for and releasing information to the media

5.1   Introduction

Statistical organizations cannot sit idly by and wait for the media to contact them with questions and requests. Nor can they simply disseminate raw data and expect the media to tell meaningful and accurate stories about the numbers. Instead, an organization must engage the media by presenting statistical information in a way that is appealing, understandable and useful. The relationship between a statistical organization and its media contacts can be mutually beneficial: providing journalists with valuable content in exchange for a broader audience for statistics.

5.2   Writing a good news release

The news release is the fundamental tool for presenting information to the media. It provides interesting and newsworthy information in a concise, ready-to-use format. Its primary goal is to convince a reporter that you've got a story worth pursuing. Some media outlets—particularly smaller publications and websites—may simply republish news releases. Most will devote time and energy to pursuing a story about the particular information or event.

The statistical organization should ensure that the subject matter of the news release is timely and newsworthy, that the information provided is factual and accurate, and that the release is written in clear and easy-to-understand language.

But even with the best news release, there is no guarantee that it will be picked up by the media. News organizations may have other themes on their agenda or they may decide that the news release is not newsworthy.

Statistical organizations may have different names for a news release: "News Release", "Press Release" or "First Release" are common terms. Shorter releases on metadata, which provide background material, or those announcing an upcoming event may be called a "Media Advisory," "News Bulletin," "Tip Sheet," or "Note to Editors." Finally, to convey more in-depth information to the media, some organizations will issue a "Backgrounder" or "Fact Sheet", generally longer and more detailed than a normal news release.

Regardless of terminology, be consistent in naming your release of new and interesting data; do not use multiple names for essentially the same news content. The media should immediately recognize the label on a package of potential interest to them.

News releases are written for journalists who are usually working under time pressure. As a result, the release should be tailored to their needs. Some guidelines follow.

Contributors – writers and reviewers

Creating and distributing a news release normally involves contributors from different parts of the organization, each with a distinct role in researching, writing, reviewing and validating a news release. The three main roles are:

- **Subject-matter specialists** – Subject-matter experts who analyse data, identify main trends, check for accuracy, and draw conclusions, providing the basic content of a news release.

- **Press Office -** Communications professionals who look at the newsworthiness, language, style and readability of the news release; arrange for translation, if needed; connect to the media and journalists; and transmit the release.

- **Organization leadership** - The hierarchy or senior management of the organization, who validate a release and ensure that it is in line with the mission and strategic objectives of the organization.

The division of tasks between those three main contributors may vary across statistical organizations. In some cases, subject-matter specialists have been trained to write up their own material and are able to create a more or less final news release that the Press Office disseminates to the media. At the other end of the scale, communications professionals from the Press Office may write all releases in a journalistic style, on the basis of information obtained from statisticians.

Generally, best practice is that subject-matter experts and communications professionals collaborate to develop a factual, informative, well-written release, which is then reviewed and approved by the management.

What to write about

Write a release only if you have a story to tell, not because it is the routine thing to do. The story is NOT that you finished a report or have some data, it is what the report has to say or the story the data tell.

Even if you have no new data, consider doing a specific release if a topic is in the public arena, for example the effects of a hurricane on energy production, or something unexpected has happened and you have data pertinent to this occurrence. Releasing for a special date is another possibility; this may be an upcoming conference or high-level meeting, or a "special" day like Labour Day or Valentine's Day.

The news release should add value to the information already available from your organization, or there is no point in issuing one.

Structuring content

Format and layout

Follow established news release format and layout, including succinct information that journalists can easily reprocess and repackage. The more familiar your news release looks and the less effort it takes to convert it into an article, the more likely it is to be published.

KISS: keep it short and simple!

Effective news releases are about one page long, and should never be longer than three pages. Writing too much is the one sure way of condemning a release to the rubbish bin. Write in simple and concise language, at the level of the general public.

Inverted Pyramid and "Cut-Off-Anywhere" principles

The inverted pyramid principle enables a journalist to assess the newsworthiness of a release at a glance. The most important message is at the top, with additional points following in order of decreasing importance. It is "inverted" because conclusions are at the beginning rather than at the end, contrasting with generally accepted academic or scientific writing styles.

The first few sentences should contain few, if any, numbers. The body of the release should describe details of the event or report, arranged in order of their importance, with a constant tie-in to the headline and lead. Statistics are all about change: up, down, new high, new low, first time. Readers want to know what is new, what is different. Make the figures interesting by communicating enough detail to get the key message across without getting lost in it. There is no need to explain in detail how data were collected. Much of what interests statisticians will not necessarily thrill the general public.

Construct your release in such a way that an editor can cut it at any point and still be left with a complete "story", however short: headline, headline + subtitle, headline + subtitle + summary, and so on.

Headline

The headline or title of a release often determines its fate: it may convince a reporter to either keep the release or throw it away, so its composition is an art in itself. It should be catchy and interesting, yet exact, and capture the essence of the story. Headlines are sometimes criticized for being sensationalist or misleading because they don't tell the whole story. However, their purpose is to capture the attention of the reader, nothing more. Explain the details later. A good headline should be one line or two at most. Write it last so you can best identify the most important points you ended up including in the release.

Lead

A release starts with a lead paragraph, like a newspaper article, which captures the reader's attention and, at the same time, conveys the principal message of the data. It should be arresting, while providing a concise summary of the ensuing information. Write a short, easy-to-read paragraph, not a large block of text. Condense the story, presenting only the most interesting aspects. Think of the main message before starting to write; what is the story the data tell?

Accepted journalistic style dictates that the lead be no more than 35 words. While this is not a hard-and-fast rule, it is generally best to keep leads to no more than 2-3 short sentences and 3-4 lines long. When in doubt, break a long paragraph into two smaller paragraphs, and break a long sentence into two shorter sentences.

Some other recommendations for press releases

Jargon-free

The release should be readily understandable to anyone not familiar with the topic. Avoid using jargon and technical terms. Spell out all acronyms. Keep numbers short and easy to grasp: 30 million instead of 29 888 632.

Tables, graphs and maps

If picture is said to be worth a thousand words, so is a well-constructed table, graph or map. Tables are a good way of summarizing results; but graphs and maps can show trends or patterns in a way no text could. But they can also get easily overloaded with information and become too complex to interpret. Keep tables small and simple, avoid too many layers. Limit the messages you want to put in a graph or map, and use graphs only to illustrate a point. Make sure all units of measure—bars, lines, pie slices, table rows and columns—are clearly labelled. Refer to the table or graph at the appropriate place in the text. Make the source data for graphs available so that news organizations can make their own graphs if they wish. Avoid complicated graphs and diagrams as you risk confusing or losing readers unfamiliar with statistics.[8]

Sub-headings and bullets

Use sub-headings when possible to break the text into manageable portions. Sub-headings should be bold-faced but not underlined, as underlined text might be mistaken for a hyperlink in the online version. Use short, bulleted lists rather than long text enumerations, because lists can be scanned much more quickly.

Don't be afraid to use one-sentence paragraphs to emphasize a point.

Source information

Mention your statistical organization as the official source of the data in the lead paragraph, as in: Fact, fact, fact, "as released today by (name of the statistical organization)," or "according to the report released today by the (name of the statistical organization)." If possible, the organization logo should appear in a prominent position on the first page. Getting due credit raises public awareness of the organization, its mission and activities, and may also increase trust and credibility.

Glossary, contact and additional information

Avoid using terms that most people will not know. But if there is no way to avoid using uncommon, technical or statistical terms, explain them at the end (for instance, in a "facts" box), in a clear footnote, or link to a glossary. The news release should identify

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[8] For more information see "Making Data Meaningful Part 2: A Guide to Presenting Statistics".

a contact person, with a phone number and e-mail address to whom the media can turn for additional information. Always include a URL link to the complete report or at least to a website where additional information may be found. Be specific—make sure that the URL goes to the data, not simply to the organization's website.

5.3   Efficient delivery of news releases

Writing a good news release is not a guarantee that it will be published. It must also be delivered efficiently to reporters in a way that maximizes its chances of getting picked up and becoming news.

Timing of news releases. When is the right time?

Statistical organizations should carefully consider the timing of their news releases in order to increase the likelihood that they will be noticed and acted upon.

- Some news releases, especially those dealing with market-sensitive economic information, should be issued as close as possible to the time that the new data are made public. Generally, release dates for key data and reports are announced well in advance.

- If there is some latitude for timing, do not release your news at a moment when you risk having it drowned out by hotter news (if this can be foreseen and avoided). A release in the middle of the summer holidays may get picked up more easily than on the opening day of the Olympic Games, for instance.

- And finally, there are 'opportunistic' releases, riding along with specific dates or events. Make a press release with pertinent data on Labour Day, a national holiday, a high-profile conference or international meeting. Copy-hungry journalists might be grateful for interesting, factual and trustworthy related information and use it.

Apart from timing the date, it also pays to time the hour of your release. If you want to make the evening news or tomorrow's newspaper, you should know how news desks function and what their deadlines are. This way, you can deliver at the time that is optimal for them. If you would like them to elaborate or consult specialists for interviews or video and photo sessions, give them enough time to do so.

Creating and maintaining media lists

To target news releases in a precise manner to the media sources who will be most likely to use the information, you need to have an up-to-date, accurate and detailed list of contacts. Some recommendations:

- Draw upon all possible resources to compile a list: membership lists of professional or specific-interest organizations, yellow pages, web searches, attendance lists at conferences or workshops.

- Complement this with internal lists of contacts that exist in your organization. Do not limit yourself to press or dissemination services: subject specialists probably have interested contacts, for example, journalists who have previously contacted them with questions.

- Make it possible and easy for media, journalists or anyone to register via self-subscription (on a dedicated "contact us" part of your media page or press room), so they are sent all or specific releases. LISTSERV technology allows you to create and manage media lists, but allows recipients to subscribe themselves.

- Segment your list. Not all media and journalists are interested in everything, so try to target and send only what is likely to interest them. Do not forget regional and city media, or special-interest niche or trade publications.

Making releases visible

If you want journalists to pick up your news release, send it directly to them. But it's also important to ensure that reporters can easily locate your news and information even if they are not on your distribution list. To ensure this:

- Create a news room or media section on the home page of your website (see chapter 4). Make sure that it is updated regularly and contains useful material—both news releases and more detailed background information, when appropriate—to make it worthwhile for journalists to bookmark and visit often.

- Make it easy to re-use and re-distribute your information by taking advantage of social media and Web 2.0 technologies, some of which were discussed in chapter 3. Make your information available in XML format via RSS feeds or other syndication methods; and use Twitter to "tweet" about your latest news and to link to the new releases posted on your website.

Pre-releasing information: Embargoes and Lock-ups

Embargoes

Some statistical organizations pre-release information under an embargo. This means that, under clearly defined rules, journalists or other stakeholders get access to the information prior to its public release, on condition they do not disseminate or use it until a specified date and time.

An embargo is useful when the release contains complex information, as it gives journalists more time to digest the release, prepare a story and line up interviews in advance. By making it easier for journalists, chances are increased that complex messages will be covered. This is, however, not a guarantee that journalists will understand and report correctly.

Make sure that the rules of the embargo are clearly spelled out, that journalists or other recipients explicitly agree to comply and that they are aware of the sanctions for non-compliance. The ultimate sanction for releasing information prematurely—and thus violating an embargo—is, of course, the blocking of access to future embargoed material.

Embargoed information may be forwarded via e-mail or made available in a special Internet location outside the organization's firewall. It is wise to limit the number of recipients of embargoed information, as this lessens the likelihood of a leak and makes it easier to identify a violator.

Lock-ups

An alternative to the embargo is providing advance access to information under lock-up conditions: journalists are confined to a secure work area where they can view the information and write their stories, but they cannot transmit them to the outside world until the specified release time.

Lock-ups are used mainly for the release of high-profile or market-sensitive data.

Identifying and training spokespeople in your organization

The spokesperson is an individual designated to speak with the media, on the record, about a particular topic. Depending upon the subject matter, the spokesperson can be a statistician or other subject-matter expert, someone from the communications staff or a senior manager. A news release should name the spokesperson who is available to provide further comment. Journalists may prefer to speak to the statistician or other subject-matter expert who is most familiar with the data, but for a news release with policy or strategy implications, a senior official may be requested. Generally, a member of the communications staff skilled in media relations is best able to serve as the primary point of contact for providing basic information and, if necessary, routing the request to the appropriate subject-matter expert or senior official.

The spokesperson must be available by telephone and e-mail when the information is made public, even if this is outside normal working hours. If the spokesperson or his designee cannot be reached, this may have negative effects on your organization's image and reputation.

All spokespeople and, ideally, all staff members who are likely to come in touch with the media, should undergo media relations training. Particularly for releases on sensitive or potentially inflammatory topics, staff within the information service or customer call centre should be briefed to speak with a single voice and be consistent in the message they bring (media training is addressed in chapter 7).

5.4   News conferences and media briefings

Press conferences can be an effective way to reach the media. They should, however, be used sparingly and only for the delivery of major news. One key factor for a successful live press conference is quality visuals: charts, maps, or other eye-catching graphics; if you can, choose a beautiful or interesting setting. If your announcement does not hold any element of visual interest, a time-efficient alternative might be an audio news conference, where reporters dial in, capture soundbites and ask questions from their own phones. Moreover, using state-of-the-art technologies such as webinars or video teleconferences can be good for your image.

Holding a news conference requires advance planning. Here is what you will need to do:

- Secure a briefing room and/or teleconference lines.
- Invite the media.
- Prepare a press package (including a news release, speaker biographies, copies of charts or other visuals, and other pertinent background information).
- Prepare visual aids (PowerPoint slides or large charts).
- Foresee sufficient staff to perform all tasks required (meet, escort, hand out documentation, etc.) and have IT and technical support on standby in case something goes wrong.
- Plan the event beforehand, including prior rehearsal/media preparation, if necessary (see chapter 7).
- Prepare a list of possible questions & answers, especially on the more difficult and controversial aspects of the release, also covering off-topic issues likely to be raised.
- Arrange for visitors to enter the building and find the briefing room.
- Allot space for camera crews.
- Ensure power for video, lighting, recording devices, etc..
- Reserve microphones or boom microphones so the audience can hear the questions.

5.5   Conclusion

Writing and delivering a press release in a way that makes reporters' life easy will create goodwill and ensure not only that your news is picked up, but also that the tone of voice will be positive. Paying attention to details always projects professionalism.

6. Monitoring and measuring media activities

6.1   Overview

This chapter will discuss various tools for monitoring the media and provide some case studies.

A key part of the mandate of an NSO is to communicate the findings of its statistical and analytical programs to the public. NSOs reach a wide audience through the media. An integral aspect of an organization's media relations section should be monitor and measure media coverage. Statistical organizations are major users of media monitoring services, and for good reason. These programmes are critical to the successful delivery of an organization's mandate.

An effective media monitoring programme can:

- Provide concrete data allowing a statistical organization to assess the effectiveness of its products and programmes, ranging from publications to comprehensive communications strategies. Information gathered from analysing media coverage can be used to measure performance and to help improve these products and programmes.

- Provide data for analysing media coverage for individual news releases, and for identifying opportunities for improvement.

- Detect errors or inaccurate interpretations of statistical information in media articles or newscasts, allowing an organization to respond to them promptly. Responding to errors in media reports is an opportunity to build and strengthen relations with media.

- In times of crisis, monitor media interest in the event and the public's reaction, and use the results to adjust and improve crisis handling (see chapter 8).

- Take account of emerging issues and public concerns about critical organization programmes, such as the census, allowing staff to develop policies and services accordingly.

6.2   Some questions to ask

Communications professionals are under pressure to show return on investment. But managers face other pressures as well, such as relating to budgets.

Here are some questions an organization should consider before deciding on the type of monitoring service it wants to set up.

What media do you need to monitor?

What media are to be monitored? Newspaper articles? Television? Radio? The Internet? Social media such as blogs? Tweets? YouTube? Facebook? Video sharing services?

For most organizations, the core coverage will mean monitoring the news and, for some managers, news might very well be synonymous with printed newspapers. But

today, monitoring has to start with the Internet. Most "traditional" print publications are published on the organization's website much faster than in actual print.

There are also countless blogs, tweets, wikis and other forms of electronic communication whose writers might comment in one way or another on a statistical organization's material. Organizations must decide the extent to which they want to keep track of this cyber material.

Erroneous statements and data errors can quickly become "viral," reaching large numbers of constituents. Web-based tools are available to organizations to help manage large volumes of information. Responding to erroneous information contained in non-conventional media raises unique challenges. One challenge is judging the risk of spreading the misinformation further, and the credibility of the source in determining whether to respond. Another challenge is determining just whom to respond to in a blog or a tweet.

What kind of information do you want to retrieve?

You might like to be notified every time your organization—or one of your publications—is cited or mentioned in the news. Most monitoring services can deliver this level of service.

You might also like to discover whether your figures are used in the news without your being cited. This awareness of data being used by others would constitute a larger challenge to the monitoring service, as it demands an intimate knowledge of the figures and the different contexts in which they may be used.

Sometimes you may have other organizations releasing competing figures in areas in which you are working. Monitoring these competitors—or colleagues—might be of interest too.

And finally, you might like to follow the total discussion and dissemination of all kinds of statistical data in your country. Even if your monitoring service were able to deliver these data, the amount of information would be overwhelming.

What custom monitoring features do you want?

One important feature of any monitoring service is the speed of delivery. Old-fashioned newspaper clippings are slow and cumbersome as they need physical distribution, and often you will find out too late to react to critique or misunderstandings. A good alternative is summaries of articles that some monitoring services are able to deliver by mail or data stream. In most instances you don't need the complete article to judge it.

A web monitoring service may be able to deliver automatic extracts from articles, where your organization or your figures are mentioned. The extract should be long enough to judge the context of your figures and contain a link to the full text.

Some monitoring services deliver only once a day, but the best services provide live monitoring around the clock.

Television and radio monitoring is essential, as in many countries these media are the most important. Monitoring television and radio can be more difficult than monitoring written news however, as television and radio news broadcasts are not often available—and hence searchable—on the Internet. Commercial media monitoring services may offer monitoring of at least the news broadcasts, but probably not of the entire air time.

Monitoring television and radio may be in the form of summaries, delivered to you after prime time news. This service offers you the possibility of checking the complete news item at a later time when the story is available at the website of the broadcasting agency. Full text transcripts or audio/video clips of the news story are seldom necessary.

More sophisticated media monitoring services can tailor-make search engines that provide detail on scores of individual topics. These engines can search for articles written by individual journalists at individual newspapers on selected topics.

Some monitoring tools come equipped with technology that can help assesses media coverage on the basis of various components, such as regional issues, the economy, health, women and many other topics.

Will you do monitoring in-house or hire a service?

A variety of tools are available for monitoring media. Many organizations use web-based or electronic monitoring services provided by private-sector firms. These offer customized packages of media coverage based on the organization's needs. Cost may be the most important factor.

Organizations can also develop their own interfaces that allow employees access to media reports from a variety of news sources, including print and broadcast transcripts.

They can subscribe to services from news agencies such as national or international wire services to receive content directly from news outlets as the stories break.

The number of staff members needed to deliver and maintain a media monitoring programme within an organization depends on how sophisticated the service is to be offered.

Here you need to consider: what is the price and what are the terms? Choosing a media monitoring service is a complex decision.

How should the results be made available internally in your organization?

Media monitoring is only useful if the results can be distributed internally in your organization and made available to relevant staff in a timely way. The possibilities for this distribution may depend on the way media monitoring is delivered by the service, and the kind of metadata you may add to the results.

It is relatively easy to set up a system that once or twice a day produces an e-mail with an overview of today's media coverage for the management and other interested employees. Normally this will include extracts or summaries, preferably with direct links to the full articles.

It may be more of a challenge to give the authors of your releases or publications specific feedback on the media coverage of exactly their release or publication, as this would require the matching of individual media citations with individual releases and the adding of metadata. Such feedback, however, would be immensely useful to your staff.

Finally, it would be useful if the results of media monitoring are searchable within the organization by as many staff members as possible. A suitable user interface may be made available by the commercial monitoring company or you may set one up yourself, drawing data from you own database with media citations.

6.3 Responding to a media error

From time to time, journalists get it wrong. They may misinterpret data, make an erroneous statement about the organization, or use an incorrect number. Statistical organizations should establish a policy on how to respond to the media in such cases.

It is important to correct misinformation. First, providing the correct information ensures that the public is not confused by the erroneous report, or in the worst case, misinformed. Secondly, it helps protect the statistical organization's reputation for accuracy and reliability. Thirdly, it helps educate the journalists.

Also, journalists sometimes use an organization's data without identifying the source. A statistical organization may wish to follow up with particular journalists to ensure that they cite the statistical organization as the data source in future. Audiences have a right to know the source of the data.

How might a statistical organization go about responding to an error in a media story? First, the responsibility for responding should be clearly assigned in the organization. There must be no doubt about who is responsible for promptly assessing the impact of the error and determining the most effective course of action.

Communications staff and subject-matter experts should work together in determining the need for a response and the most effective approach. The approach will depend to some extent on the media in which the error appeared. Responses might be either formal or informal.

Informal response: A low-key approach is useful for a minor issue such as an incorrect number in a news report on the Internet. The appropriate action may involve phoning or e-mailing the journalist and having the problem corrected online. Such an informal response might take only a few minutes. Errors that appear on the web should be corrected immediately. Otherwise, they might spread to other media. You might also wish to follow-up to ensure the correction has been made.

Formal response: This may be necessary in matters that are more complicated, such as a misinterpretation published in a news article, or aired on radio or television, on the day following release. The approach can vary depending on the severity of the error. For example, a telephone call may be appropriate to inform a journalist of the error.

A more formal written response, such as a letter or e-mail to the editor or producer of a newscast, may be warranted in the case of a major error, in particular if the error is uttered by a politician or a commentator. We should, however, be aware that the figures we issue are supposed to be used by all actors in the societal debate, and that politicians in particular should be allowed some room for interpreting the figures as they deem necessary.

Timing is critical. Responses should be sent as quickly as possible, preferably on the same day that the error occurred. If an organization takes too long to respond, the media might ignore any request to print or air a correction.

We need to differentiate between opinions expressed in media reports and factual errors. Opinions may be negative towards an organization or its programmes, but they may not be factually incorrect.

Opinions that are damaging to an organization's reputation may warrant a response, depending on the impact or extent of coverage. Negative opinions expressed through media with very limited circulation may not warrant a response. But a negative editorial in a major newspaper with extensive readership may require follow-up.

In responding to an error, organizations might want to inform not only the journalist who wrote the report, but also the individual quoted in the report, if this person appeared to have been responsible for the error.

Responding to errors is an opportunity to build and strengthen relations with media. When contacting journalists, for example, media relations staff can provide contact names for them to call at the time of the next release. This access to contact information should lead to more accurate coverage in the future.

Before contacting the journalist, media relations staff can also scan previous reports by that journalist to identify issues of concern, and to understand the journalist's areas of interest and viewpoints. This research could lead to opportunities to expand coverage of a particular release or to suggest story ideas that the journalist might consider in the future.

Finally, you should make the response to the media visible internally in your organization. This response could take the form of a note in the daily internal media bulletin that an error or misinterpretation has been discovered in this or that media report, and that it will be dealt with in this or that way. Informing the staff about the response will prevent other staff members from attempting to deal with the problem, and in the long run it will increase staff awareness of errors or misinterpretations and their confidence that incidents are dealt with in a professional manner.

Media monitoring in Statistics Denmark

Statistics Denmark is a small national organization with a staff of 550. Media monitoring is bought from a commercial provider, who delivers journalistic summaries of media citations of the organization, its publications or staff three times a day. Automatic web monitoring is delivered around the clock. The provider monitors practically all national printed media—more than 900—as well as 2,000 Internet news sources.

The media mentions are forwarded in mail and data stream format complete with metadata on source, page, time of day, journalist, etc., allowing the information to move automatically into our internally-created database. Each media mention is identified by our staff and supplied with metadata identifying the exact release or publication responsible for the coverage. Our internal publication system automatically links the media mention to the staff member(s) responsible for the release.

Media citations are routinely reviewed for errors or misinterpretations, and action is taken immediately if this happens. Every morning at 10 o'clock an e-mail is automatically drawn from the database with the media citations of the last 24 hours—including any comments from our media centre—and forwarded to interested staff members.

A user interface on the intranet makes it possible for all staff members to follow the coverage of "their" releases or statistics in real time, and to search for earlier coverage. It is possible to search by releases, dates, media, journalists or just text strings.

Ten days after publication, authors of news releases or publications—and their managers—receive an automatic e-mail with an overview of the total media coverage generated.

Once a month we publish an internal newsletter with media statistics of the month: How many media mentions did we get compared to the same month last year? How many mentions did each department and division get compared to last year? Which releases got the most coverage and which releases got the least coverage? Which media provided the best coverage? The data for this monthly newsletter are, to a large extent, drawn automatically from our media coverage database. We are a statistical organization, hence what counts is statistics!

Media coverage statistics are widely used internally for decision-making. For example, we may have as many as five news releases on a single day, but only three can be placed visibly at the top of our website—the others will just be mentioned with a link. In this situation, the releases are prioritized according to media interest, the releases with the greatest number of previous citations at the top of the website. We issue 550 news releases a year.

The same goes for internal development work. Whenever our releases or publications are discussed, figures on media coverage are always useful information.

Every month we get around 2,500 media citations, making it somewhat more than 100 mentions per working day. The external costs of media monitoring at Statistics Denmark is around 57,000 Euro a year. Two members of the media staff work at least half-time on monitoring, but a lot of other staff members around the organization are engaged as well.

Monitoring of blogs is carried out by individuals. We use Google Blogs Search (http://blogsearch.google.com) and the results are stored and handled in our own database.

Media monitoring in Statistics Canada

Statistics Canada provides daily media monitoring of major newspapers and magazines, as well as radio and television broadcasts.

The organization has created an electronic interface for employees to view media coverage through its NewsBriefs feature on the Intranet. It provides access for all staff to daily news articles and broadcast transcripts from more than 45 major Canadian news sources.

The service allows employees to browse news sources or perform searches including articles of interest (usually coverage of a specific release or mention of Statistics Canada), release coverage (identifies each release and related media coverage), news by topic, and other functions.

It includes immediate e-mail notification when there is news related to a specific release and comprehensive reports summarizing the entire coverage of a release.

Media monitoring staff usually arrive around 7.30 a.m. (earlier on Mondays because of the additional media coverage from the weekend) to review news feeds and identify articles that may require follow-up or response.

Throughout the day staff continuously monitor Internet news sites and blogs and peruse a variety of electronic media services and databases to which the organization subscribes.

Statistics Canada monitors social media by using common web, news and blog search tools, e.g. Google (blogsearch.google.ca), Yahoo (news.yahoo.ca), addictomatic.com, RSS News aggregators, etc.

Some search alerts are set up for automatic notification by e-mail. Searches are also conducted in Twitter and in Facebook. Some sites on the web, including social media-type sites and some micro-blogs, are also searchable using Dow Jones Factiva (to which Statistics Canada has a corporate account).

The organization has also experimented in the use of the social media search interface service developed by Radian6 called the "Social Media Dashboard".

Canada's media monitoring program combines a self-service approach where all staff can access media monitoring products and services through the Intranet with a dedicated and continuous monitoring function. This program alerts managers to contentious or erroneous media coverage where immediate action may be required.

6.4   Conclusion: learn from the media

A robust programme of media monitoring will strengthen an organization's ability to communicate effectively. This programme should extend beyond simply monitoring and responding to media.

Information gleaned from analysing the volume, extent and tone of media coverage can be used to make informed decisions on the organization's programmes and activities. Ongoing concern expressed in media reports about the quality of the information or a declining amount of media coverage for a particular release may be useful in evaluating programs and changes to releases.

In some cases, a response can lend credibility to an organization or extend the debate on a particular issue. A lack of response, however, could result in greater exposure of an error, as misinformation is shared among interested users.

7. Media training

7.1   Introduction

Do statisticians need media training? If they engage with journalists on air, in print, or online, then the answer is yes. Senior staff may meet journalists only a few times a year to talk about policy or aspects of running the organization. Subject-matter experts may encounter the media on a more regular basis, answering queries and delivering briefings.

Both groups can benefit from tailored training, but individual needs will vary. Senior managers may wish to run through role-playing scenarios and work out key messages prior to a live TV interview; subject-matter experts may need to know how to handle tough questions from the journalists they speak to on a regular basis. Learning how to deal with difficult interviewers, how to boil down complex ideas into clear soundbites, and how to present information on radio or television can help improve the delivery of statistical messages to the media and public.

Who does the talking? Organizations should draft a policy on how to handle media requests for information and interviews. Commentaries need to remain policy-neutral. Subject-matter experts, while qualified to talk about numbers, may not be equipped to handle policy issues or the interpretation of data. Managers must talk to employees when they first join the organization to work out when to refer to their line manager. Staff need to be clear about how they are expected to respond. If in doubt, calls for 'comment' should be referred to a manager. Some statistical organizations routinely forward all media calls through to the media/information office for appropriate comment.

7.2   Clear communication

Communicating through the media can strengthen the image of statistical bodies with the public and policy-makers. Talking to the media gives organizations greater credibility if they wish to be seen as open and honest. Making statisticians available to explain in a clear, concise manner what the data mean generates better understanding. However, statisticians can fail to communicate because they sometimes:

- Concentrate on small details, not the bigger picture.
- Look at their work from the inside out, not the outside in.
- Put methodology before the results, not the headline before the story.
- Use too much statistical terminology (jargon) rather than plain language.
- Fail to visualise what they talk about and fail to paint pictures with words.
- Lack soft interpersonal skills.

A coordinated approach to media training can provide statisticians with the self-confidence and skills to get their messages across.

7.3   Types of media training

Training can be provided:

- Internally—using the organization's own staff to deliver courses/refresher sessions on handling the media.
- Externally—through a media trainer: often former TV/ radio journalists offering tips on presentation/delivery.
- Online, through an internal e-learning course or short video training module.

No single method is best. Internal courses obviously save money. When organized by former journalists working in-house, they can prove invaluable. But external trainers can offer fresh perspectives on the fast-changing media world and insights into how to handle tricky interview situations. Online training modules are best employed as refresher or introductory courses to complement existing training.

7.4   Evaluating training needs

Ideally, departmental managers should draw up and maintain lists of "who does what" in terms of talking to the media. Managers need to recognise that while many staff will need to be familiar with the needs of the media, not all staff will be called on to represent the organization on network TV news. Managers must make judgement calls: senior staff who never speak to journalists probably don't need media training. Equally, senior staff who have trouble with public speaking or self-confidence should not do "live" TV or radio interviews. Conversely, junior staff may be excellent media performers and might handle a combative interview with authority. Before deciding who does what, it is worth establishing a structured approach to training. The following four-step method is one possible framework.

Levels of training

Basic: for everyone who deals with a journalist at work. The course is typically geared towards understanding how the print media work, and how the needs of newspaper reporters differ from broadcasters. A basic course would introduce staff to the way the media work and help develop awareness of the kinds of pitfalls associated with off-the-cuff conversations with newspaper journalists. A basic course would be a one-day workshop introducing staff to the way journalists think and operate. The course might also include tips on how to prepare for a newspaper interview, how to write a news release, and how to prepare and "pitch" a story to a news desk. A mock phone interview with a newspaper journalist and a mock recorded radio/video interview would also help staff understand the dynamics of communication. The course could be provided by experienced internal staff or external journalists and trainers.

Intermediate: for statisticians and communications staff whose job involves hands-on dealings with the media, and who might handle TV/ radio interviews on their statistical topic, or offer comment to the media as information officers. This level of training would include message development, showing how to identify potential issues before an interview arises, explaining differences between broadcast and print interviews, and offering practical exercises on how to communicate best on radio and TV. Again, this would be a one-day course.

Advanced: essentially geared towards senior managers who might be called on to do live broadcast interviews or act as "ambassadors". Advanced courses can coach staff in how to deliver clear, confident messages, how to present with authority by bridging across difficult questions to give cogent answers, and how to stay calm and "on message", even in a potentially stormy live interview. Advanced courses will typically involve chunks of theory with intensive practical experience. They could also include a mock live TV or radio studio interview, a mock pre-recorded television interview, and a mock live interview where a statistician is speaking directly to a studio presenter via satellite link.

Continuous: designed to refresh media skills. It may involve in-house training—purchasing a digital voice recorder or a video camera, tripod and microphone, and introducing lunchtime sessions that allow staff to face mock broadcast interviews and sharpen their skills. Continuous training could take the form of a one-day refresher course with an external training company. Alternatively, it can be done online, in the form of an e-learning package (see section 7.5).

Evaluating success of the training

Course success needs to be evaluated. To ensure that training remains on track, it is helpful to log each person's training record: date/time/course/level. The external or internal media training provider can offer feedback to both the trainee and, where appropriate, the organization itself. A statistical organization should set up a group to discuss media training issues, evaluate feedback from trainers, draw up lists of who needs further instruction, and evaluate whether interviews have been successful. If an interview goes badly, consider more training, help and support.

Examples of current media training methods

United States National Center for Health Statistics (NCHS): conducts in-house, formal media training sessions several times a year and one-on-one sessions as needed before a high-interest report is released. These sessions focus on training statisticians to develop clear talking points and navigate difficult and controversial questions from reporters. In addition, the lead statistician for a report will often participate in an audiopodcast to practice question-answering techniques. NCHS also provides media training tips and instructional video clips on the organization's intranet site, as well as media training online as a refresher and introductory course (see section 7.5).

Statistics Denmark: offers coaching if an employee is to be interviewed by radio or television. Employees are coached by communications staff in how to answer questions and develop key messages. All employees of Statistics Denmark who might have contact with the news media undergo an internal media course, providing information on media policy, press techniques, and written and oral communication. Employees should be able to speak to the news media about their subject matter work. Staff contacted by the news media must be able to assess when a matter should be referred to others in the organization. The internal course is run by an external communications adviser as well as an internal journalist and media coordinator. New employees also receive initial orientation on Statistics Denmark and media relation shortly after their first working day.

Central Statistics Office, Ireland: uses a specialist company to train statisticians to talk to the media. The trainers are usually journalists who provide practice scenarios on how to communicate clearly and with confidence and engage with listeners. An in-house presentation skills course is also available to all staff. It is not as tightly focused on the media as the external course, but it is recommended to all staff who deal with the media. At Director level if someone is likely to spend a lot of time dealing with the media, particularly television then specific training for TV interviews and televised press conferences is arranged for them. This would usually be for national campaigns such as a Census.

United States Census Bureau: contracts out for expert media trainers to work with upper management, especially those who are expected to have frequent interaction with the media. Statisticians and other subject area specialists, identified by their supervisors as potential media spokespersons, are trained in-house by public affairs specialists from the Public Information Office (PIO). PIO will provide refresher media training on request, and staff can find online assistance on the Census Intranet. Under the PIO online heading "Working with the Media," staff can find topics such as "Preparing for Interviews" and "How PIO Can Help You." Finally, a course titled "Media Skills Training" is taught by PIO to groups of Census Bureau employees upon request.

Office for National Statistics, United Kingdom: gives media training to all staff who might speak to a journalist on the phone, via e-mail, or face to face. ONS hires external media trainers (often former newspaper editors/ TV and radio broadcasters) to provide basic, intermediate and advanced courses. The more advanced the class, the smaller the class size. Special one-to-one master-classes with external trainers can help senior staff revise their messages ahead of important announcements. ONS has purchased video equipment for in-house refresher courses.

7.5   General media training

Preparing for a media interview

Most media calls received by information officers are not calls for interviews: they are calls to check specific numbers, to question statistics, and to ask how they should be interpreted. However, interview requests arise, often when high-profile statistical documents are published. The key to a good interview is preparation. In an interview, statisticians hold all the factual cards. They must get information across in an engaging, accurate and entertaining way, drawing pictures with words and delivering memorable words that make an impression. The trick is to anticipate what the statistician might be asked and prepare answers.

Before agreeing to a print or broadcast interview, a media relations/information officer should discuss specifics and set out a few ground rules (for instance, restricting questions to a statistician's specialist field). All interviews should be underpinned by "soundbites"—putting all the information in crisp, clear sentences that sum up key messages.

Setting out objectives

An interview is a two-way street. Find out a few details before agreeing to do anything. Who is the reporter? What angles do they want to cover? Don't ask to see questions in advance for a broadcast interview. Always mention your own statistical angle: tell them what you're prepared to talk about and not talk about. If you think you have an interesting angle, say so: the journalist may not have had the time to make sense of the information. Statistical organizations are best placed to explain data patterns and trends, but broader political questions may be for others to answer. Ask the journalist how much they know about the subject. When is their deadline? Why are they interested in covering the story?

Newspaper interviews

Interviews with print journalists are almost always conducted over the phone. Do not make unguarded remarks. Deal with specifics. Take time to think of the answer, or agree to phone back. Even better, ask for the questions via e-mail, and reply via e-mail. The statistician or communications officer should always feel in control. Print journalists may be satisfied by e-mailing a few questions that can be directed to the statistician. Most quotations are best provided by e-mail: they make sure the data printed is accurate, they make it easier for the journalist to "cut and paste" the quotation into their story, and help control the message.

DO	DON'T
Gather as much information about the interview and subject matter in advance. Ask the journalist to provide background, and offer to supply answers via e-mail (to avoid errors).	Answer questions which you, or the statistician, are not equipped to answer.

Comment on trends and patterns shown by the statistics—help the journalist to make sense of the data.	Comment on the policy implications of the statistics themselves.

Radio interviews

Radio interviews are potentially difficult if they are being broadcast "live", but much easier to handle if pre-recorded, as the interviewer wants your 'best' and most entertaining answer: not necessarily the best statistical answer. Try to avoid unplanned and direct head-to-head "live" confrontations in a radio studio: the presenter may have your organization's fiercest critic on the telephone. If they catch you by surprise, it can be difficult to stay on track.

DO

- Find out whether the interview will take place in the studio or on the telephone. If a journalist is coming to see you or you are giving a telephone interview, you will need a quiet room with no background noise.

- Check whether the interview is pre-recorded or live. Pre-recorded permits statisticians to make mistakes: wrong answers can be edited. In a live interview, a statistician will have no second chances.

- Know the nature of the interview: are they putting you in a head-to-head situation with someone who will argue against your figures? If so, be confident that you can tackle the adversary, and work out what you can say in response. If you can't, decline the interview.

- Ask how long the interview will last, and find out who will be listening. Is it for a news bulletin, a discussion programme or a light-hearted topical show? Find the right tone of voice.

- Write down your key points before the interview. Keep repeating them throughout the interview to ensure your message gets heard. If reading from statistical tables, highlight the data to mention with a marker pen. Sound like you are saying it—not reading it.

- Keep it simple. Paint pictures with words. Be friendly and open. Use informal, everyday language. Talk as though you were talking to just one person. Emphasize the positive.

- Sit comfortably upright with your feet flat on the floor. Relax.

DON'T

- Use technical language.

- Sound unconfident: avoid nervous "ums" and "ahs."

- Keep talking to fill silences. It is not your responsibility to keep the conversation going.

- Make a sound other than speaking, e.g. shuffle paperwork, tap your fingers or accidentally hit the microphone.

- Wear tight-fitting clothing.

Television interviews

Often a triumph of style over substance, TV interviews are about style, soundbites and appearance, especially when commissioned by news programmes. Current affairs/ documentary programmes pose greater challenges: a longer format, longer answers, and more complex issues.

DO

- Be aware that there are three types of TV interview: a face-to-face interview, either sitting or standing, at your organization (where you look at the reporter); a down-the-line interview with a studio (where you look straight into the camera lens); or a studio interview (where you sit with the presenter in a TV studio and answer questions).

- Try to discuss the topic with the reporter/host before the interview.

- Anticipate what you will say, and work out some clever phrases that will liven up the answers.

- Run through likely questions and answers with a colleague: the tougher the questions, the better.

- Dress smartly and wear solid colours. Appear well groomed. Be positive and friendly.

- Accept makeup if offered. Regular TV interviewees should consider investing in some basic makeup.

- Check your appearance immediately before you start. If you do a live TV interview with your hair sticking up on end, people will remember how ridiculous you looked, not how wonderful you sounded!

- Look at the interviewer all the time, blink naturally and maintain eye contact at all times.

- Look down the camera lens if you are doing a down-the-line interview with questions asked through an earpiece.

- Talk in a measured, conversational and entertaining way.

- Give short answers: they should be no longer than 10 to 20 seconds. Try to end each answer on a significant or interesting point, which might even guide the interviewer to the next question: "Levels of inward investment have been high over the past year, according to our figures, but we've also been carrying out new research into how we've fared over the past five years, and these figures are much more interesting and give us a better picture...".

- Paint pictures with words and use metaphors or mental images that everyone will understand.

- Stay focused.

DON'T

- Wear weak colours. Avoid loud or checkered patterns and pin-stripes, distracting items or jewellery (particularly brooches/ big earrings).

- Touch your face, be distracted or look furtive.

- Lose eye contact at any time—before, during or immediately after the interview.

- Talk too quickly.

- Be put off by anything around you, especially if the interview is live. A passing car, something shouted in the street, or a camera being moved in a studio can break your train of thought.

- Worry too much about the statistical content—once you have remembered a few key headline figures and three key points, you should have enough information to talk for several minutes.

- Shift around in your seat or on your feet, fidget, blink or look down.

Online media training/advice

Many media training companies, consultants and public bodies now publish tips for conducting media interviews on their websites. Plenty of advice can be found online. Below is a model for media training developed by the United States National Center for Health Statistics (NCHS). The graphics have been left in to act as a template and practical guide by public affairs/media officers.

Example of an online model for media training
U.S. National Center for Health Statistics (NCHS)

NCHS has developed an online media training curriculum for statisticians. The aim is to enhance, refresh, and/or initiate training for personnel with varying degrees of media experience. Setting up a standard basic or refresher training course that can be completed at a convenient time in one's organization and at short notice is a good complement to traditional seminars and individual training sessions.

Content covered in a basic media training course are loosely defined as follows:

- What the media interview clearance process entails at the organization.

- How to anticipate and prepare for questions from the media.

- How to decide what your message is and how to best convey and stick to that message.

- How to determine the way to communicate complicated data to a general audience.

- How to achieve a positive physical appearance.

Adding an online media training course

The NCHS Public Affairs Office provides an in-house media training program that prepares staff for television interviews as well as coaches them for interviews in other media such as radio or newspaper. NCHS has typically offered one-on-one training for statisticians

who are associated with an upcoming release that is judged to be of high media interest. This training focuses on identifying difficult and out-of-scope questions, determining the main and secondary messages featured in the upcoming release, and learning how certain items in a report can best be communicated to a wide, general audience.

NCHS has also offered quarterly or biannual media training seminars. These sessions are more in-depth and focus on the delivery and content of a message to a reporter on the phone, in a live radio format, or on camera. Appearance and mannerisms are addressed by videotaping each trainee's performance. In addition, the NCHS media training video is shown to staff, and a brief overview is given of media outreach activities and protocol at NCHS. The online media training does not replace either of these types of training; it is merely a process by which tips for handling media inquiries can be provided on a last-minute basis or as a basic or refresher course. The following is a brief example this course, which complements the other training.

Areas to cover

Types of Media. This area includes the discussion of print and electronic media as well as the types of interview formats that are often used by different media.

Types of Media

- ◆ Electronic Media
  - – Radio – National Public Radio
  - – Television – ABC, CBS
  - – Web-based – Web MD, MSNBC.com

Protocol for Setting up a Media Interview. This area covers the process by which an interview is approved and scheduled and how a statistician can protect him or herself from violating any important protocols.

Protocol for Setting up a Media Interview

- ◆ Media interview requests must go through the NCHS Office of Public Affairs (OPA).
- ◆ When a member of the media contacts a member of NCHS staff directly, he or she should be directed to call OPA at 301-458-4800.

Preparation. This area includes assessments to be made by the statistician, such as, "Why do I want to do this interview?" "Am I really the right person to do this?" and "What is my message?" Also, the statisticians are instructed how to prepare for an interview and achieve message control by setting their own agenda and choosing their sound-bites.

Facing the Music – Preparing for the Interview

- ◆ What is your message?
  - – Set the agenda – Only answer what you know; don't offer any opportunity for hearsay.
  - – Choose your sound bites – Memorize or write down key information that you feel is important to highlight, then find an opportunity to say it.
  - – Remain cool under pressure – Remember that you are in control of what you say, no matter what the question.

Things to Avoid. This area reminds statisticians to avoid speaking in "statish," to review and practice the wording of any complicated material, and to explain acronyms.

Don't…

◆ …speak like a statistician.
◆ Sure, you went to school for years to become an expert in your field, but if you explain statistics in a way that people cannot understand, your message will be dead in the water.

Physical Aspects. This area instructs statisticians on dressing properly (i.e., dressing in a manner that best represents them and their organization), identifying and eliminating distracting mannerisms, and maintaining good eye contact.

The Way You Look Tonight…

◆ Remove distracting items
  – This includes dangling earrings, big necklaces, ribbons, flashy scarves, etc.

◆ Any of those can distract from your message!!!

Checklist. A checklist for preparation and for the interview itself is provided.

Preparation Checklist
- Why should I do this interview?
- Am I the right person to do this interview?
- Have I developed the main message(s) I want to convey?
- Am I dressed properly (for a television interview)?

Interview Checklist
- Set the agenda/ lay ground rules
- Stick to the main message(s)/points
- Eliminate distracting mannerisms
- Maintain good eye contact (during television and radio interviews)
- Reinforce your main message(s)/points

Your Checklist – The Interview

◆ Set the agenda.
◆ Stick to your message.
◆ Eliminate distracting mannerisms.
◆ Maintain eye contact (television).
◆ Reinforce your main message points.

Review. A short quiz follows the presentation in order for the trainee to review some of the most important aspects of the training.

Test Your Knowledge

◆ When a reporter calls you and says, "I'd just like to clarify this data," you should…
  – **A.** Clarify the data, then notify OPA.
  – **B.** Direct the reporter to contact OPA.
  – **C.** Clarify the data, but tell the reporter he or she cannot quote you until he or she talks to OPA.
◆ Right answer is **B. Direct the reporter to contact OPA.**

Frequency

This course is designed as a basic introductory or refresher course for statisticians who may come into contact with media inquiries or interview requests, or, if a statistician has an unexpected interview request, as a last-minute tips course.

Other Features

The course gives directions to staff on how to request further media training.

7.6   Training journalists

Journalists can be helped to understand statistical data better. Training helps them access and interpret data independently, saving time. The following is a list of possible ways of educating journalists and developing better working relationships.

University outreach. Statistics Denmark organizes visits to three different universities to speak to students about statistics. A journalist and an information specialist from Statistics Denmark visit each university once a year. They provide a guest lecture session, which ranges from two to six hours. The day focuses on the proper use of statistics in the media, statistical pitfalls, how to extract a story from large amounts of data, and generally introduces them to services offered by Statistics Denmark. If time allows, students try out some exercises and ask questions.

Guidance online. Taking reporters through statistical tables and series online is a very effective way of helping them to navigate through data. When reporters call, a statistical media officer can guide them to the right databases and correct series, thus helping them to help themselves in the future.

Exchange visits. Statisticians visit a newsroom and journalists visit a statistical organization. Helps mutual understanding, but logistics are often difficult to arrange and benefits are limited. These types of visits may need to take place over several days to develop understanding.

Workshops for journalists. It is useful before a "big" statistical release where reporters are invited to a formal seminar and workshop on specific statistical subjects. This method helps the media understand the data before the release date, cutting down on demand/calls for specific information.

7.7   Conclusion

Media training should play a pivotal role in every statistical organization. Good media training develops clarity of thought, sharpens key messages, and gets important information across to the widest possible audience. The media are the quickest path to the public. Although effective communication is everyone's responsibility, it lies mainly in the hands of confident speakers and senior managers. It is the latter group who must make a total commitment to media training. The key is to set up a system, choose the most engaging staff to get positive messages across, and give them regular refresher sessions. Practice really does make perfect.

8. Handling media crises

"There cannot be a crisis next week. My schedule is already full." —*Henry Kissinger*

8.1   What is a media crisis?

What would happen if someone in your organization released confidential data? What if you are accused of suppressing information for political reasons? What if market-moving data are not released on time or not released to everyone fairly? In these and other situations, statistical organizations will find they have a crisis on their hands. A crisis occurs without warning and creates a chaotic and disruptive atmosphere. With a crisis there can be apprehension, confusion and lasting damage to the reputation of your organization. If handled properly, there is also an opportunity for a positive outcome.

A crisis by its very nature is temporary. There may be after-effects—which include how the crisis was handled—but the actual crisis is usually short term. The key to addressing a crisis is to use the best possible talent and develop the best solutions in the shortest period of time.

A negative incident in a statistical organization becomes a media crisis when the media become aware of it and get involved. Even with policies and control procedures in place, unexpected events could disrupt the operations of an organization and negatively impact its image for a long time.

To pre-empt a negative reaction, it is often advisable to contact the media through the release of a press statement that tells the organization's story before someone else does. This proactive approach can diffuse a potentially harmful media crisis. If the media were to report on the incident before you have time to tell your side of the story, you could still issue a press statement outlining your point of view, offering organization contacts for the media to talk to, and explaining clearly what happened and how the situation will be resolved.

Despite our best efforts, things will occasionally happen that place a statistical organization in an awkward or embarrassing position. Whether it is loss of confidential data or an intrusion by computer hackers, we must be prepared to react and quickly take control of the event to minimize damage to the organization.

8.2   Being ready for a possible media crisis

Preparation is the key to handling crisis communications. This chapter will show you haw to handle a crisis and give you tips on how to be better prepared. It provides tools and guidance to inform properly the media, your employees, other affected parties, and the public during an emergency. By taking an open and honest, proactive approach you should be able to:

- Protect the reputation of your organization.
- Coordinate with appropriate offices and "speak with one voice".
- Prepare spokespersons to give consistent, accurate responses.
- Control the spread of rumours by the public, media, or your own employees.

Plan ahead

Determine who and how to respond. Create a "Crisis Response Team" and make sure the members receive crisis communications training. Members should include the head of the organization, the head of public affairs/media relations, and any others who play a critical role in the running of the organization. Don't wait for an incident to occur before you decide who should be involved on the crisis response team! Keep the number of members manageable. You may even want to identify a location that can be used by the crisis response team if an emergency arises. The location should provide privacy and the necessary means to take action.

Identify vulnerabilities

Five types of crises are of particular concern to statistical organizations:

- **Data releases** - mistakes requiring significant and frequent data revisions.
- **Organization image** - unlawful or ill-perceived activities (e.g. sexual misconduct, drug use, financial infringement, indictment or arrest of a senior organization official), allegations against your organization, or things that make respondents less likely to participate in surveys/censuses. These are the most difficult to counteract.
- **Community** - adverse condition created by outside individuals/organizations hostile to the organization or its mission (e.g. computer hackers, anti-government activists, negative blog campaigns).
- **Facilities** - damage caused by explosion, fire, water leakage or natural disaster.
- **Employee** - loss of life, bodily harm, sabotage or issues surrounding working conditions.

Make an assessment of any things that could go wrong during the normal course of business. In your efforts to deal with technological breaches, don't overlook things that could affect the reputation of your organization.

Prepare standby statements

Standby statements are concise, "fill-in-the-blanks" messages that can help with crafting the first response/statement given to the media. They should reflect your identified vulnerabilities. Vulnerabilities of statistical organizations in different countries can be different, so focus on the situations that might be applicable to your organization. Below is a list of possible standby statements to develop:

- Unauthorized computer access to organization website.
- Sudden interruption of work.
- Public denunciation of data or need for data by an elected official or community leader.
- Protest or demonstration by a population subgroup.
- Alleged sharing of confidential data with other agencies or law enforcement.
- Telephone system overload (for data collection or fulfilment activities using telephone).
- Falsification/loss of confidential data or personally identifiable information (PII).

Sample Standby Statement

> **Unauthorized Leak of Data**
>
> At [time and date] an [unintended release of XX data] occurred resulting in [illegal trading? unfair access?] and [whatever else happened] to [affected parties].
>
> [How the organization plans to rectify the situation and make sure it doesn't happen in the future.]
>
> We will provide additional information about the [crisis] when it becomes available.
>
> For further information, contact [name and contact info].

When releasing information to the media, stick to the facts included in the standby statement—never respond with "No comment." If pressed, say: "The situation is still being assessed. We'll have a statement for you as soon as we have all the facts."

Once the standby statement has been released, a Crisis Response Team should meet to conduct a situation analysis, focusing on the following tasks:

- Analyse media response to the standby statement.
- Assemble a list of all resulting media questions.
- Conduct any necessary research and develop talking points that respond to expected media questions.
- Respond fully to all subsequent media questions, using the approved talking points.
- Continue to identify any potential issues that could become problems.
- Assess lessons learned to improve future performance or prevent recurrence.

Plan and practice. Develop a Crisis Communications Plan. Conduct crisis communications training for those likely to serve as spokespersons in the event of an emergency and those who may be involved with determining what to do and how to handle the media. If possible, simulate some of the situations that might confront your organization.

Distribute procedures to staff. Draft written procedures or a manual that is given to appropriate staff. Staff should keep a copy at home as well as on their laptops or hand-held mobile computing devices to refer to while travelling. Call-trees (systematic lists of prearranged contact chains) should ideally be kept in an electronic database that is continuously updated, and includes telephone numbers (work, mobile, home) and e-mail addresses (work and home) for key individuals:

- Organization employees.
- Parent organization employees, if required.
- Contractors.
- Reporters, with their media outlet information.

Standby statements should be routinely modified and updated, and distributed to all key personnel. The most recent edition should be kept in an electronic file available to all approved staff.

Be sure your communication plans include how you will notify your organization's internal employees about crises, and keep them updated.

8.3   Crisis examples

Media crises can arise from the unauthorized or early release of statistical data, or the release of statistical data containing errors. Media calls to the organization are often the first indication of a problem with data errors. If this happens, organization media specialists need to interact quickly with the subject specialists who produced the data to develop talking points that respond to known and expected media questions.

With the advancement of information technology and the Internet, the collection of personally identifiable information has increased. The accidental or deliberate exposure of this sort of information has become a major source of real and potential crises for national statistical organizations.

Below are three examples of circumstances that can lead to a media crisis. The first involves a mistake in a news release written by a media specialist, the second is an error made by a statistician who prepared a report for release, and the third is a breach of respondent personal information.

Data error in a statistical news release

An NSO issued a news release announcing the release of an annual statistical compendium, citing findings from the organization and other organizations. The news release highlighted a finding that "text-messaging" had doubled in volume in the past year. That afternoon, a reporter from the major newspaper called to report that this information in the release appeared to be incorrect. The reporter had contacted the source of the data, an international non-profit membership organization that represents the wireless communications industry, and learned that the text-messaging data represented one month, not the whole year.

What happened next? The organization's media specialist contacted the subject-expert staff who had produced the compilation, and they confirmed that an error had been made. Within an hour, a revised news release was issued through the organization's wire service and website. Media specialists also contacted reporters who had called during the day with questions about the compendium. In addition, a copy of the revised news release was sent to the data source organization with an apology.

Why did this mistake occur? The media specialists had received data findings from subject specialists and used them to create a news release. Unfortunately, the news release author had only the findings, not the statistical source tables. To minimize future occurrences of such errors, subject specialists are now required to furnish the source tables with the findings so data can be checked and verified by the authors of the releases.

Data error in a statistical report

An NSO issued its annual news release on income and poverty data findings from a major population survey. The next afternoon, the subject experts who had prepared

the data notified the media office that they had discovered a statistical error in the findings. The error concerned the "female-to-male earnings ratio", which was reported as unchanged, but which had actually declined from the previous year.

By the next day the news release posted online had been replaced with bolded statements and the phrase "REVISED" placed at the top of the new text. At the same time, appropriate corrections were made to all the relevant material on the website, including the webinar presentation script and PowerPoint slides and the PDF version of the full report.

Breach of respondent personal information

Many NSOs are now using laptop computers to collect survey and census data from respondents and administrative records. In the process, personally identifiable information, such as names, addresses, national identification numbers, and other personal data, are entered on these laptops as control information. If compromised, the personally identifiable information can be used by criminals to identify or locate individuals for identity theft or to perpetrate other crimes. The accidental loss or theft of a laptop containing personally identifiable information can result in a serious crisis for an NSO, and steps must be quickly taken to protect those who are potentially at risk.

When an NSO recently discovered that a number of laptops used by survey takers had been lost, the following steps were taken:

- A Crisis Team was gathered to assess the problem and determined that each laptop contained no more than an original ten-respondent case load, and most had already completed and transmitted at least half of their cases to the processing centre.

- Letters were sent from the director of the organization to the respondents whose data were on the missing laptops to notify them of the situation and to provide information about using consumer-reporting services to monitor for potentially fraudulent activity.

- Talking points for use by organization spokespersons were prepared and approved.

8.4   What to do when a crisis occurs

First actions

Get the facts. Try to determine, as best you can, what actually happened. Answer the following questions:

- Who is involved?
- What actually happened?
- Who is affected by the crisis?
- What immediate measures can be taken to fix the problem?
- Who needs to be contacted?

Follow-through

- Respond with actions or statements that will take the event out of the "emergency" phase and get accurate information to the media and the public.

- Report up and down the chains of command, including satellite organizations and parent organization.

- Gain some measure of "control" of how the event is regarded by the media and the public, continuing to provide accurate information and having the situation under control.

Monitoring

- Is the event over?

- Has media or public interest in the event subsided?

- Does more need to be done?

Follow-up when the crisis is over

- Evaluate how the crisis was handled.

- Did the Crisis Response Team work efficiently?

- Brainstorm the lessons learned.

- Should something be changed in crisis communications in future?

- Determine what triggered the crisis and what should be done to avoid the same kind of crisis in future.

Things to keep in mind

The Internet and web applications mean that crises can develop and spread very rapidly, so emphasis needs to be on "planning ahead."

As crises do not happen only during working hours, be prepared for evenings and weekends when important responders may be hard (or impossible) to reach.

Finally, remember that the public's immediate assessment of an organization in crisis is based on these four factors of earning trust and credibility:

- Empathy and/or caring (usually assessed within the first 30 seconds).
- Competence, expertise and readiness.
- Honesty and openness.
- Dedication and commitment.

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

Making Data Meaningful

Part 4:

How to improve statistical literacy: A guide for statistical organizations

UNITED NATIONS
New York and Geneva, 2014

NOTE

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Acknowledgements

Introduction

Statistical literacy: to comprehend the world

''Statistical Literacy'' is the ability to understand and critically evaluate statistical results that permeate our daily lives—coupled with the ability to appreciate the contribution that statistical thinking can make in public and private, professional and personal decisions".
- Katherine K. Wallman

 "Statistical literacy" is a term we use to describe the ability of a person or a group to understand statistics. For more than 30 years, researchers have been discussing this interdisciplinary topic in fields such as mathematics, statistics, education, psychology and linguistics.

It requires mainly mathematical and statistical skills, as well as the ability to interpret the figures and to distinguish between valid and invalid data. And it enables an individual to assess the information that figures provide and understand what the data reveal about the world.

What contributes to a person's ability to comprehend statistical information? The main factors would include educational background, literacy level, world knowledge and individual beliefs on mathematical and statistical issues, as well as how critical or accepting a person is of information coming from different public and media sources (Murray & Gal, 2002). Other factors could be "statistical anxiety" (Bradstreet, 1996) and "mathphobia" (Phillips, 1988), since most people associate statistical ability with mathematical ability.

Traditionally, we statisticians have been occupied with producing figures. Only recently have we started to consider that we can only communicate successfully with people who use our statistics if they can fully understand them. Statistical agencies have therefore been launching several initiatives to increase statistical literacy. The initiatives are aimed at scholars and students, journalists, decision makers in politics and businesses, and last but not least, the general public.

In this introductory chapter, we'll talk about the abilities included in the term "statistical literacy" and look at who the user groups are that need training.

Stage 1: Statistical numeracy: How much is 20 per cent?

Frequently we notice misunderstandings and misinterpretations of (official) data in media reports, in daily newspaper articles and in direct contact with our users. This weakness in quantitative skills is referred to as "statistical innumeracy".

Among the younger generations and in developing countries in particular, there's an increasing need to understand quantitative data and facts. Mathematical skills are a basic requirement for understanding statistics. Statistical numeracy requires a feel for numbers: an appreciation for levels of accuracy, the ability to make sense of estimates, awareness of the variety of interpretations of figures, and a judicious understanding of concepts such as averages and percentages. It's also basic to have a knowledge of statistical approaches and methods.

Although statistical numeracy is learned in schools or at university, it can't be taken for granted. In recent years, statistical institutions become aware of a global lack of statistical numeracy among the average population and we had to act upon it.

One main task of official statistics is to inform people about the development of the economy and society. To do this, we need to train people in interpreting the figures. We have many options for how and where to start. We could, for instance, cooperate more closely with the educational community.

In the following chapters, we'll describe best practices in teaching statistics.

Stage 2: Communicating statistics

More than statistical numeracy, statistical literacy includes the ability to read and communicate the meaning of data. Wherever you add words or pictures to numbers and data in your communications, people should be able to understand them.

Guides such as previous issues in the UNECE's *Making Data Meaningful* series (parts 1 and 2) set international standards that help to ease the understanding of statistics for an international audience.

As the volume of quantitative information increases, we need to simplify tables and charts. We should also offer comparisons, as many figures only have real meaning in relation to others. Providing additional and background information is also a useful contribution to successful communication.

Context. Good examples include context explanations or links that embed statistics into a topic of interest to the user. They rank or highlight important developments in graphs and tables.

Transparency. As well as knowing something about the quality of the data, users also need to know in particular about the legal framework of official statistics compared with, for instance, market research institutes or untrustworthy providers of "data".

Stage 3: Discovering the use of statistics for professional and personal decisions

Getting users to appreciate the value of statistics is perhaps the most difficult and most fundamental step. Decision makers in businesses and politics may need support particularly at this stage. The general public are also important, as high-quality official statistics are an essential pillar of a democratic society.

Who are our user groups?

User groups can be defined by their level of knowledge and by the purpose for which they use statistics. Just as each group has different needs, the strategies that would benefit them will also be different. Three broad levels of statistical literacy can be applied to the user groups—basic, intermediate and advanced (ABS, 2007). These groupings help our organizations cater to actual needs and prioritize our efforts to ensure better long-term outcomes.

Basic. The individual will be aware of, understand and appreciate the type of study or data source used (survey, census or administrative data set), be able to find definitions of statistical terms and understand basic statistical measures and graphic representations of data.

Intermediate. The individual will understand and appreciate the limitations of the methods used, understand the more commonly used statistical concepts and terms (e.g. labour-force-participation rate), understand variability and uncertainty, and be able to interpret probability statements associated with sample estimates.

Advanced. The individual will be able to understand the more sophisticated statistical terminology, understand sampling errors and non-sampling errors, understand what constitutes a valid statistical study, make valid statistical inferences and critically assess claims made about the data.

Schools

Developing the statistical literacy of future generations. This group includes schoolchildren as the next cohort of "data generators" and "data users", and schoolteachers as facilitators. Integrating statistical concepts and reasoning from the elementary years through to secondary school should develop a population of critical thinkers and competent consumers of information. This should ultimately ensure social progress, good governance and solid business leadership.

Schoolteachers need to be able to teach statistical concepts and convey the importance of statistics. They also need to be skilled readers and interpreters of statistical information.

Third-level institutions

The client group within third-level institutions comprises students, teachers and lecturers in vocational and technical institutions, universities and across academia and research. Increasingly, employers are requiring their staff and new recruits to be able to understand statistical concepts, as well as to be able to analyse, interpret and evaluate statistical information. The shortage of people undertaking mathematical and statistical training is further compounding the problem; and this appears to be an international phenomenon (Chinnapan et al., 2007).

Third-level institutions have a responsibility to ensure that their graduates are fully equipped to deal with a burgeoning data age—that they can access, use, understand and appraise statistical information. Regardless of the academic discipline, statistical literacy should be considered basic. Many advocate the broader integration of statistics into all courses and support the development of statistical literacy as an interdisciplinary curriculum in the liberal arts (e.g. Schield, 1999).

Decision makers

Decision makers are the key client group for the information that our organizations produce. This group includes "commercial decision makers" in industry, business and trade and "political decision makers" such as policymakers, members of parliament and staff from agencies at all levels of government.

Decision makers need to be able to define the elements of the required data, know where to access the right sources and know whether the data are "fit for purpose". They also need to be able to critically appraise the information presented and analyse and interpret data. (ABS, 2008).

All these skills are needed for developing policy, guidance, confirming progress and monitoring outcomes in this age of evidence-based decision-making. This type of decision-making is important, as governments are publically being held accountable for policy outcomes.

Likewise, commercial decision makers increasingly need to be able to interpret statistical information so that they can make strategic decisions about investments and the direction of future growth.

Opinion leaders

Opinion leaders (e.g. journalists) have a duty to ensure that statistical information is used and reported correctly. The media are a powerful agent in the dissemination of statistics and presentation of facts. In today's world, people are increasingly relying on media sources for accurate facts and interpretations of the world.

> "The overwhelming majority of the public will never directly consult a national statistical agency or communicate with it directly. For most citizens, the news media—newspapers, radio and television—provide their only exposure to official statistics. Consequently, collaboration with the news media as an agency's 'gatekeepers' to the public is of great importance". (Smith, 2005, p. 1).

General community

General community refers to the public, with a focus on selected groups, especially owners of small businesses, disadvantaged groups (who don't fit into one of the other groups) and community organizations. With the proliferation of statistics in the media and on the Internet, people's ability to critically evaluate the information is fundamental to effective citizenship (Gordon & Nicholas, 2006).

Other groups

We also need to target two other distinct groups. These are the respondents and our own staff. And although these groups aren't necessarily data users, they're critical to the production of high-quality official data.

Respondents

Every statistical organization has to ensure the willing cooperation of respondents. But the survey environment is becoming increasingly challenging. Not only are respondents more difficult to contact and more heavily bombarded by public polling and market surveys, but there also appears to be a greater sensitivity to any intrusion of privacy.

By targeting our statistical-literacy activities towards respondents so that they understand the importance of data, we can get higher response rates, and respondents are more aware of why we're collecting the data.

4

One of our key objectives should be to increase trust in statistics and promote understanding of the importance of data to policy- and decision-making. Results from a survey on trust in the Australian Bureau of Statistics (ABS, 2010) show that individuals with greater knowledge of the Bureau also reported greater product trust in the Bureau, a better understanding of Census and the value of national statistics for policy and planning. The increased trust also led to better response rates.

Staff of statistical organizations

A statistical organization can't operate without first-rate people. The quality and vitality of our programmes depend on engaging the finest and most talented recruits and investing in continuous learning for all our employees.

Putting it all into practice

So how can we develop the statistical literacy of the user groups with all their different needs? The following chapters will provide some answers.

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I. Overview of initiatives

A. International Statistical Literacy Project

Mission

The International Statistical Literacy Project (ISLP) promotes statistical literacy worldwide http://iase-web.org/islp/. Created by the International Statistical Institute in 1991 as the "World Numeracy Project", the mission of this unique programme is to support, create and participate in statistical literacy activities and promotion around the world.

Up to now, the focus has been on young people, teachers and schools; but a future aim is also to develop adult statistical literacy and education of occupational groups such as media and libraries who pass on statistical information. Other important target groups are decision makers and the general public. The goal is to promote statistical literacy in all walks of life.

ISLP today

The ISLP approach is to do extensive networking and cooperation with various actors. The project has more than 80 country coordinators, whose main tasks are to improve statistical literacy and implement the ISLP plans in their own country or region.

The main idea of the project is to develop operation models that can be used in many countries and that should be applicable to both developed and developing countries.

On the project's website, you'll find useful links, including to teaching materials and information about ISLP activities. The project publishes a newsletter twice a year. It has also produced several presentations and articles, e.g. by the country coordinators. In 2008, the project published an online book *Government Statistical Offices and Statistical Literacy*.

It organized several events such as international statistical literacy competitions and best cooperative awards.

Competitions

- How to interpret statistics and graphs
- How to evaluate the reliability of statistics
- How are the statistics describing society produced?
- Where can I find statistical data when I need them?

These are the kinds of question that may come up in the International Statistical Literacy Competition, aimed at schoolchildren between the ages of 10 and 18. The main goal of the competition is to increase awareness of statistics among students and teachers throughout the world, to promote statistical literacy resources and to bring together people who are interested in statistical literacy in each country. Its objective is also to help students describe their environment with the help of statistics and to use statistics as a tool for making sense of their daily lives.

The competitions have three phases: (a) within schools; (b) winners from each school compete to be national champion and (c) national champions compete in the international final.

The ISLP organized three statistical literacy competitions:

2007. Pilot statistical literacy competition in Portugal.

2008-2009. The very first statistical literacy competition. This competition had three phases and was done in five languages without the use of computers.

2010-2011. The form of the third competition was a poster, prepared in teams of two or three. Teams were registered by teachers. This competition was divided into two age categories: students born in between 1992 and 1995; and students born in 1992 and younger. The aims of this poster competition were to:

- Work as a team
- Investigate real questions using data
- Use calculation and graphical skills
- Interpret statistical results
- Develop written communication skills.

Organizational structure

The project is composed entirely of volunteer activities. The operational structure is as follows:

- An executive, consisting of the ISLP director and two deputy directors. The executive's roles are: planning, coordination, liaison with the International Association for Statistical Education (IASE) and overseeing implementation of plans.

- An advisory board, consisting of IASE president (chair), the ISLP director, three IASE representatives, a representative of the International Association for Official Statistics, and a council member of the International Statistical Institute (ISI).

- Country coordinators. Their roles are to implement plans within their country or region, and provide information, liaison and suggestions to the ISLP executive. Country coordinators don't need to be members of ISI or its sections.

B. Dissemination and communication

As part of the work programme of the Conference of European Statisticians, a Steering Group on Statistical Dissemination and Communication organizes annual work sessions, supported by the UNECE secretariat. The Steering Group aims to promote good practices in dissemination and communication of information by statistical organizations. Its work focuses on issues such as:

- Communicating with the media
- Managing customer relationships and outreach

- Gathering and analysing feedback
- Statistical literacy
- Managing the dissemination and communication functions within a statistical organization.

The Steering Group produces the UNECE "*Making Data Meaningful*" series of practical guides. The guides are intended to help managers, statisticians and media-relations officers in statistical organizations use text, tables, charts, maps and other devices to bring statistics to life for non-statisticians.

C. Statlit.org

The primary goal of the independent website statlit.org is to present statistical literacy as an interdisciplinary activity. As such, it overlaps with quantitative reasoning, quantitative literacy, numeracy and statistical reasoning. The site features books, papers and activities related to statistical literacy—taken from a variety of disciplines. A secondary goal is to present statistical literacy as the study of statistics in everyday arguments.

The webmaster is Milo Schield, Director of the W. M. Keck Statistical Literacy project and Vice-President of the National Numeracy Network in the United States.

Meeting the needs of different groups

Numerous initiatives are aimed at developing statistical literacy across different target groups, and most of these can be summarized into the following two types of strategies: raising awareness and developing strategic partnerships.

Raising awareness

A fundamental statistical-literacy activity is to ensure that people are aware of the extensive data and statistics held by our statistical organizations and the importance of this information for effective decision-making.

We can use many strategies to generate public awareness and interest in national statistics and their practical application to everyday life. These range from increasing exposure of statistics in daily newspapers to producing electronic newsletters, alert mechanisms and blogs for specific target groups.

This may entail a cultural change for many of us, as well as developing skills for our statisticians to market their statistics and present data in ways that are relevant, interesting and accessible.

Cultivating interest in statistics from an early age will prove strategic to future successful outcomes. We need to become involved in running competitions for schoolchildren and in developing real-life case studies and activities to illustrate the practical applications of the statistics. This includes supporting student participation in international projects that focus on developing statistical capability.

Raising awareness of the importance of statistics for sound decision-making and social progress is critical to developing positive "statistical attitudes". *Brand Awareness* (Murray & Gal, 2002) is an important consideration for statistical

organizations to ensure that citizens and decision makers access and rely on their official data and reports rather than on other sources or on anecdotal information.

Developing strategic partnerships

We must establish relationships with key stakeholders to improve the information flow between producers and clients and ensure that data users can understand and apply the information (Head, 2008).

Ultimately, each of these client groups must be viewed as partners in developing statistical literacy. We should establish networks with our key client groups to facilitate greater interaction so that we understand their needs and how they operate.

Also, by forging strategic partnerships and alliances with other associated organizations, we can address the needs of specific target groups. For example, to increase the statistical literacy of schoolchildren we need to engage the whole education community: teachers, teacher educators, researchers and curriculum developers, as well as academics and government officials.

We must look for opportunities to maximize impact. For example, an effective means of ensuring long-term and widespread outcomes would be to influence school curricula in mathematics, science and geography to increase the focus on statistical content and statistical reasoning.

We should also consider supporting initiatives such as the ISLP and work in partnership with statistical societies such as the IASE. International sharing of experiences and resources, creating opportunities for international collaboration, facilitating broader discussion and research, will all serve to promote and develop statistical capability globally.

Increasing access to information

Statistical data need to be disseminated to the widest possible audience if maximum benefits can be achieved from the investment made in collecting and compiling the data in the first instance. Caricom (2004)

Making data accessible and relevant is the key to improving and promoting their use across target groups. Dissemination mechanisms and systems need to make it easy for users (e.g. practitioners, managers, policymakers and consumers) to access information. Effective dissemination depends on understanding the needs of the diverse user groups and then matching this with the appropriate medium and level of detail.

In disseminating our information, we need to ensure that it's clear and unambiguous. Reducing the "noise to signal" ratio—i.e. the amount of caveats and qualifications as opposed to the key messages and implications of the findings—would help governments make greater use of evidence in policy and decision-making (Davies, 2004).

Visualization is one means of presenting complex data in ways that are both engaging and easily understood. In this, the work of someone like Hans Rosling is exemplary. He developed Gapminder, which has changed the way data can be

presented. Documentary *The Joy of Stats*, (Rosling, 2010) demonstrates the creative and dynamic use of statistics to make sense of the world and explore changes over time and into the future.

To promote awareness of data and what they mean, we can now use an array of mechanisms and social media platforms such as YouTube, Twitter, blogs and wikis to communicate across different target groups and demographic profiles.

Developing and delivering statistical training

By providing training, information seminars on data sources and other didactic techniques, we can help our key client groups to better understand statistical concepts, processes and data applications for key client groups. Training for specific groups such as teachers or journalists can be an effective way to improve community levels of statistical literacy through their intermediary roles within other target groups.

Training can be presenter-based in a face-to-face setting, or short self-help online tutorials or e-learning course modules. But to be effective, it must match user requirements. "Just in time" training can also be built into online data access tools to provide users with key information at critical points in time.

Offering support services

Another mechanism we can employ to promote the statistical literacy of data users is to develop resources and materials, either online or hardcopy, to support the informed use of statistics. These materials can range from posters to information brochures or technical notes that accompany statistical reports. We can also produce information, guides, fact sheets and other learning resources to support the better understanding of statistics across a range of topics, statistical concepts, processes and purposes. Needless to say, we should tailor them to meet the specific needs of each client group.

Evaluating outcomes

To ensure that our strategies to improve statistical literacy across key target groups are achieving the desired outcomes, we need to be able to evaluate the impact of these strategies. So, how can we quantify an increase in the public's appreciation of the value of statistics?

To promote the uptake of knowledge and changes in behaviour and attitudes, we have to interact with the client groups to obtain insights into how effective our dissemination strategies are, and we must continuously modify the strategies to suit their purpose.

Summary

Our role as a statistical organization has been changing. It's no longer enough just to collect and produce statistics. To stay relevant and responsive, we need to understand the needs of our diverse user community, improve our dissemination processes, raise awareness of the value of these statistics and actively encourage their informed use.

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II. Educating the opinion leaders

We can find "opinion leaders" or "strategic information users" in the following sectors: media, world of politics, private sector, non-governmental organizations and academia.

Media

The media are high-impact distribution channels for the information we generate. Opinion leaders here use the following communication channels to share their ideas and opinions with their audiences: television, radio, printed media, and web services.

World of politics

The opinion leaders in the public sector have a direct impact on the public policymaking process and serve as a model to different groups in society. These users might also be producers of statistical information.

Private sector

The opinion leaders in the private sector are those large enterprises and business organizations that have a large impact on the economy of their countries.

Non-governmental organizations

The opinion leaders in this group are represented by trade unions of different sectors, political parties, civil associations, religious organizations, etc.

Academia

We also find strategic information users in research institutions, universities and think tanks.

After identifying the opinion leaders or strategic information users in all of these sectors, we should maintain an updated database that individually identifies the leaders in each sector as an action field.

A. Reasons for educating the opinion leaders

- To have direct contact and close interaction with them, and therefore have a better and dynamic process of crafting statistical information.

- To make them, as drivers of public opinion, channels of communication for the information we generate.

- To improve their decision-making by having quality, timely and relevant information.

- To get their feedback so we can provide better products and services to satisfy their needs.

- To position our organization as the provider of official statistical information as opposed to non-official data sources.

- To help them interpret and present data correctly.

B. How can we educate the opinion leaders?

Develop a free Strategic Information Users Training Programme to meet their information needs and familiarize them with the products and services that we offer.

Step 1. Design an ad hoc training programme by identifying and registering their general and particular needs by means of:

> Web services
> A call centre
> Information requests by email and letters
> Face-to-face communication

The Programme should be divided into basic and advanced programmes, based on these users' needs.

Example of topics that could be included in a Strategic Information Users Training Programme

Basic Programme:

> Statistical information available

> Handling the statistical organization's website

> Using the statistical organization's interactive data consulting tools

> Economic information database

Advanced Programme:

> Digital maps

> Data warehouse

> Business directory

> Industry classification system

Step 2. Select the people inside your statistical organization who have the right capabilities to educate the opinion leaders in each topic.

Step 3. Define the optimal format for the training programme (e.g. online or face to face).

Step 4. Create an annual training programme by scheduling these courses periodically, starting from the basic programme, moving on to more complex

topics that could include other products and services provided by your statistical organization.

Once you've developed the Strategic Information Users Training Programme, you should encourage these opinion leaders to participate by offering personalized presentations.

To formalize your relationship with the opinion leaders, you might consider signing a cooperation agreement with them.

Tools

Your website will serve as your main tool for training. It should therefore be kept up to date and take into account the feedback from the strategic information users.

You could also offer specialized opinion leaders direct access to their data warehouses, and possible access to microdata.

Other tools that you could offer as a service to opinion leaders include various platforms that you've developed to make data meaningful. For example:

- **Geo-referencing tools:**

Virtual Private Network, Internet, Web services
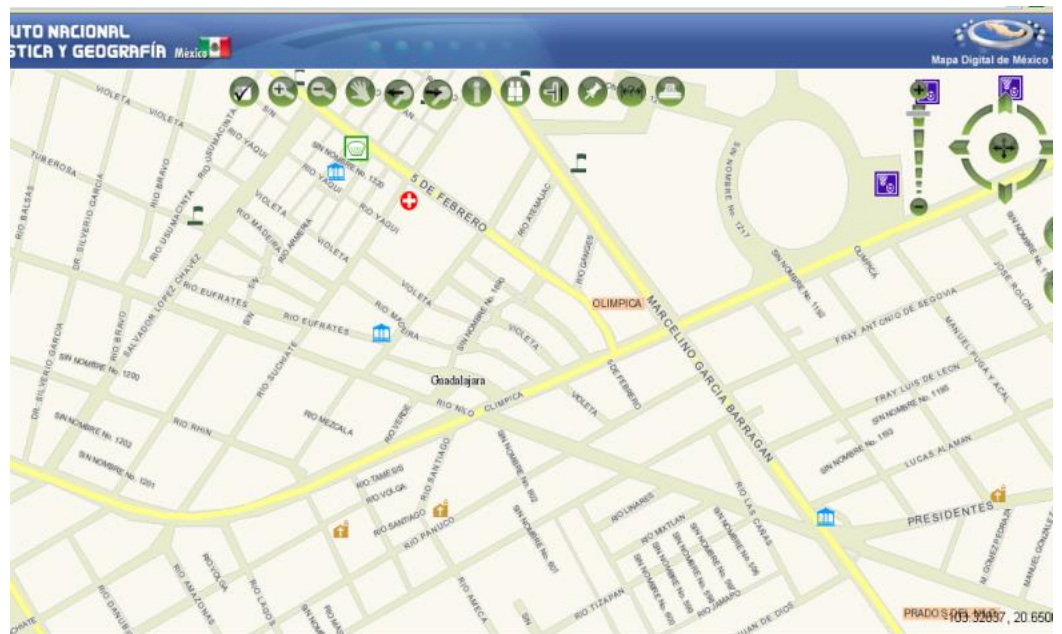
- Statistical data cubes (allowing multidimensional data analysis with multiple factors crafted for the requirements and needs of strategic information users).

III. Improving the statistical literacy of decision makers

A. Who are the decision makers?

In this chapter we'll focus on "political decision makers" such as policymakers, members of parliament and staff of agencies at all levels of government.

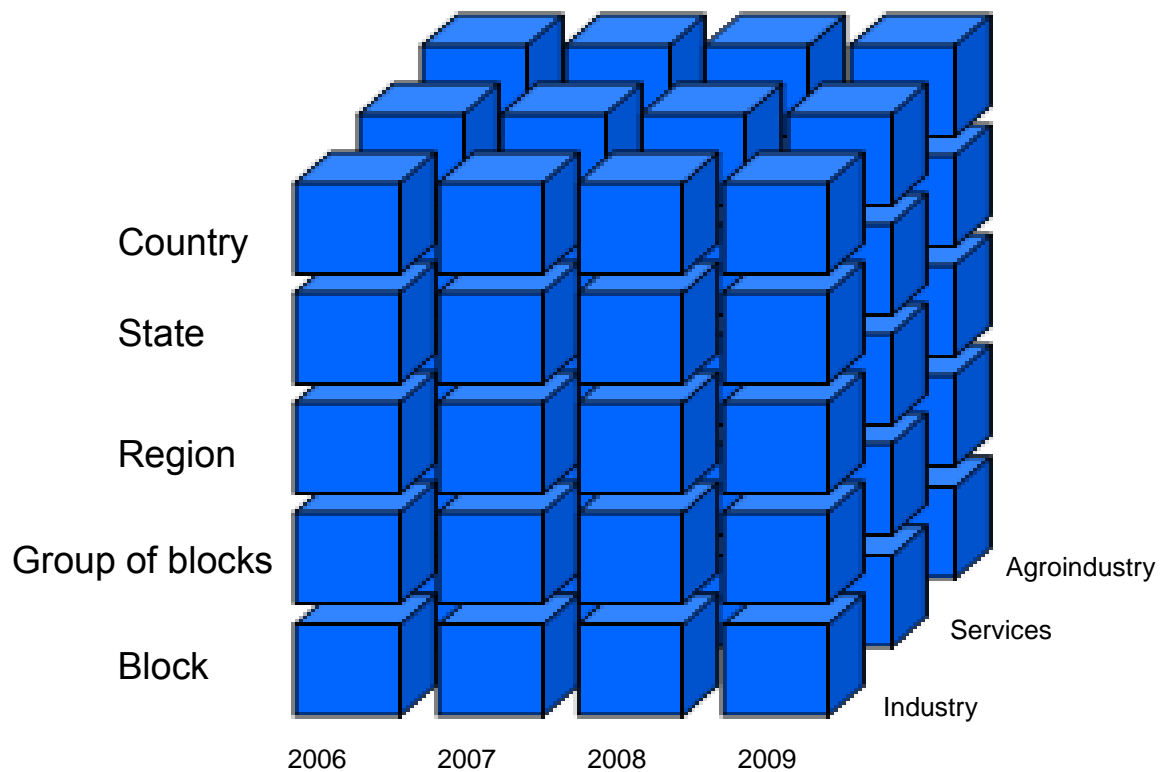Governments make decisions for public policy, and public policy determines the location of schools and medical services, the allocation of resources, the implementation of programmes and interventions, the direction of trade investments and so forth. As the decisions made today will affect our children tomorrow, those decisions should be based on reliable, high-quality information sources.

Our role, therefore, is to provide a responsive statistical service that supports the evidence required by governments for identifying issues, evaluating programmes, planning for the future and making informed decisions.

Political decision makers need to be able to access, use and understand statistics:

- **To identify and understand the issues**. Statistics are critical for accurately identifying economic, social or environmental problems and for developing a better understanding of these by analysing patterns in the data or trends over time.

- **To set the agenda.** Statistics provide a vital source of evidence to support decisions for new or altered directions and to establish the urgency of action.

- **To formulate a response.** Once an issue has been identified and recognized as important, a rigorous statistical analysis can help to formulate a response and assess the cost benefits and effectiveness of alternative response options. At this point it is necessary to define aims and goals clearly with quantifiable indicators for measuring success.

- **To set benchmarks**. Benchmarks are needed to measure progress.

- **To monitor and evaluate results**. Finally, statistical evidence in terms of quantifiable outcomes against established benchmarks is critical to the effective monitoring and evaluation of results.

The policymaking cycle (below) illustrates that information comes from many sources (government and non-government) and concerns all aspects of the decision-making cycle: from obtaining recognition of an issue to the design of policy, then monitoring implementation and evaluating impact.
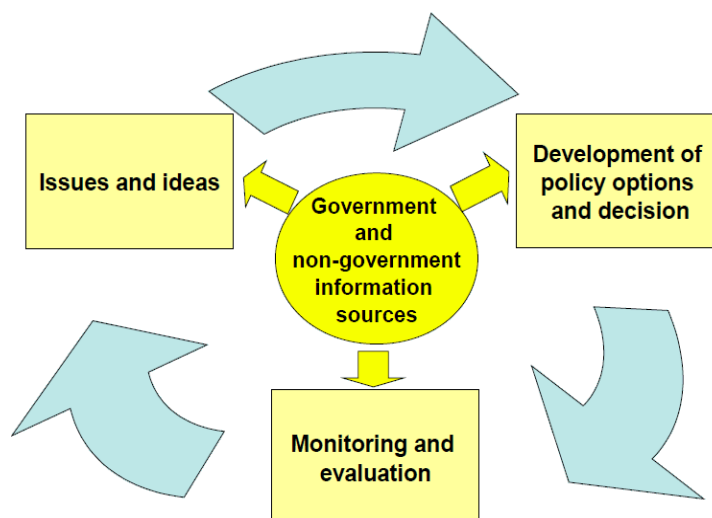
B. What decision makers need for using official statistics effectively

Although it has support, the application of evidence-based policy may be difficult. For instance, sources of evidence can come in many forms, both qualitative and quantitative, the required data may not exist, or there may be conflicting information from a range of sources. So, while statistics can provide clear, unbiased and undisputed numerical facts on an issue, alone they do not form evidence. They must be analysed and interpreted effectively.

Statistical literacy skills are vital for the informed use of statistics in decision-making. They can be summarized in terms of four broad criteria:

- Data awareness
- Ability to understand statistical concepts
- Ability to analyse, interpret and evaluate statistical information
- Ability to communicate statistical information.

Data awareness

By offering our expertise and working with government agencies, understanding their policy drivers and helping them to define their data needs, we can ultimately improve the decision-making process.

Defining data needs

Helping decision makers define the elements of **data need** before identifying **data sources** ensures a much better process for getting the right data.

Starting with the available data source and then using this as a basis to determine data need is a data-informed decision. But it risks missing key important points and is less likely to create innovative policy.

To define data need, you need to:

- Articulate the issue or area of investigation
- Identify the key population (i.e. demographic and geographic)
- Specify particular time frames being investigated.

Ability to assess data quality and "fit for purpose"
After their data needs have been defined, decision makers must then be able to identify suitable data and information sources to address that need.

Political decision makers must be able to assess the data to ensure these are suitable and of sufficient quality for the issue under investigation. Ensuring the **objectivity of evidence and its rigorous application** is essential to good use and ultimately good decision-making and policy.

From the perspective of official statistics, a number of criteria determine "fitness for purpose" (ABS, 2008) and decision makers need to be made aware of these. They include:

- Institutional environment
- Relevance
- Accuracy
- Timeliness
- Accessibility
- Interpretability

Coherence

Providing tools, resources and frameworks to assist decision makers assess data quality and fitness for purpose will facilitate evidence-informed policy. Resources such as the Australian Bureau of Statistics (ABS) Data Quality Framework: www.abs.gov.au/ausstats/abs@.nsf/mf/1520.0, which has been based on other international data quality initiatives, and the Data Quality Online Tool: www.nss.gov.au/dataquality/ are being actively promoted across government agencies in Australia as resources to help decision makers better understand the quality of available data.

Understanding statistical concepts

Fundamental to the ability to use statistics effectively in decision-making is the need to understand a number of statistical premises—including differences between a random sample and a census population, whether data collected are observational or experimental and if analysis is descriptive or inferential.

Another essential for data analysis and effective decision-making is the ability to read information presented in tables, graphs and maps and interpret the meaning and implications of statistical concepts such as percentage, ratio and variability.

Analysing, interpreting and evaluating statistical information

The ability to critically evaluate the statistical information presented, determine appropriate analytical techniques and identify when concepts have been applied

without proper statistical foundation are essential to using statistics in effective decision-making.

Decision makers need to be able to monitor and evaluate policy outcomes and options using statistical evidence as well as define reasonable and meaningful benchmarks to measure success.

Communicating statistical information

They also need to be able to communicate statistical information and understanding in a way that makes it real, relevant and meaningful to the audience and gives the data context and credibility. This involves drawing out the main relationships, causations and trends in the data and being able to report on progress towards the set benchmarks.

IV. How can a statistical organization support evidence-based policymaking?

We can help government clients make better use of official statistics for informed decision-making. We can, for instance, increase access to data and metadata; provide tools to assist in interpreting statistical information; develop statistical capability and work collaboratively to enhance understanding of needs and identify opportunities.

Increase access to statistical information

An important step in being able to use statistics to make informed decisions is being able to access data sets, metadata and information relating to the statistical context in which data are collected.

Making data freely available online greatly facilitates access to statistical information. Too often, however, data and statistical information are hard to find or are not presented clearly. Best-practice principles for accessibility include:

- Storing data in an open format that's not restricted to any particular product or technology

- Having a permissible copyright licence such as Creative Commons

- Ensuring strategies for keeping the data set up-to-date

- Having a website that's intuitive and easy to navigate, and that includes effective search tools to improve both data visibility and accessibility.

Develop communication channels

Government agencies need to be aware of the data that are available, and to have information on the uses and limitations of those data. Mechanisms for achieving this could include:

- Regular newsletters tailored to client needs and providing information about new statistical developments, publications, seminars, training and reviews; current and future statistical releases and feature articles illustrating the use of statistics.

- Web 2.0 technologies such as tweets, blogs, wikis and mash-ups that allow government clients to interact with information and keep up to date with national and international statistical releases.

- Specialized government web portal—allowing for a tailored approach to government clients for finding urgent and relevant information and resources.

- "Road show" presentations designed to raise awareness of the data and services that are available. These sessions can target client groups and their specific data needs, as well as enabling discussion.

Build statistical capability

Government client groups are increasingly asking for basic statistical training. Many statistical organizations provide courses on a range of statistical literacy skills and specialist learning opportunities. By offering training and resources that help decision makers understand the statistical process—from data collection through to data analysis, testing of assumptions and evaluation of results—we promote the use of statistical evidence in decision-making.

And where government agencies are also data custodians, there may be opportunities to develop capability in metadata management practices, improve data quality, capitalize on administrative data sources and facilitate data sharing within and across agencies. This is becoming increasingly important for addressing the range of multidimensional issues that are facing society.

Establish consultative forums

Our statistical organizations must stay relevant to government needs. One mechanism for demonstrating statistical leadership to achieve better outcomes is through establishing advisory or consultative forums. These should be chosen to represent a broad cross-section of perspectives across government, business and academia in order to provide advice on key policies likely to affect statistical priorities.

They can also help assess the relative merit of statistical programmes, the adequacy of statistical services, and external pressures that might affect statistical activities.

Establishing collaborative forums for consultation between government agencies and statistical organizations encourages dialogue within and between agencies on strategic statistical issues, operations and processes.

Provide outpostings to government agencies

A tangible way to help bridge the gap between policy and research is by out-posting statistical staff to government agencies. The outposted officer can provide statistical leadership in the host organizations, promote wider awareness, understanding, access and use of official statistics, and also increase the capability for research and analysis within departments.

These outpostings can help statistical organizations to better understand emerging policy issues and statistical requirements of government, promote and implement statistical frameworks and standards that allow comparisons across agencies, and help maintain professional relationships and engagement with other agencies.

Organize conferences

We can also promote understanding of the statistical landscape by holding regular conferences that bring together key statistical partners, both nationally and internationally. Such forums help promote mutual understanding and enable decision makers to develop effective policies and strategies, as they:

- Increase awareness of the importance of statistics
- Demonstrate the effective use of data
- Strengthen the infrastructure and use of data
- Promote better collaboration for sharing and maximizing the use of statistics.

Provide statistical leadership

We can work closely with government decision makers to promote the value of data as a "statistical resource" and develop mechanisms that maximize the potential of data to explore complex issues. We can offer the expertise necessary to initiate dialogue and investigate opportunities to increase the potential for using statistical information for evidence-based policy and decision-making, such as:

- Statistical data integration—linking social, economic and environmental data sets
- Identifying and developing nationally important data sets
- Coordinating agreement on high level principles for improved data use and outcomes
- Improving access to domestic and international statistical information.

The strategies already discussed also offer us opportunities to continually build a strategic relationship with government decision makers, and to help position our organization in the minds of the government as the first organization they'll consult with when considering developing their statistical capability.

To position ourselves as a strategic partner with government in relation to statistical issues (with government being both a data producer/custodian and data user), we need to have a strategy in place where government officials can understand how we can support them in their strategic data-driven initiatives. We also need to have in place resources and expertise to respond to those strategic opportunities to provide statistical leadership.

Conclusion

Increasing opportunities for communication, collaboration and consultation are the most effective means for us to understand political drivers and provide the necessary advice, assistance and support for evidence-based decision-making.

We need to leverage these opportunities to be involved from the onset in important discussions relating to statistical infrastructure or capability issues rather than be perceived as an online shopping catalogue of data sources.

We can play a vital role in providing a responsive statistical service and supporting the statistical needs of political decision makers. This includes not only developing an understanding of available information and how it can be used, but also working towards a coordinated and integrated statistical system that promotes evidence-based decision-making.

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V. Statistical literacy for the education community, including how to influence curriculum development

The teaching of statistics is one of the most important instruments for improving statistical literacy. In many countries, it's included in the mathematics curricula of primary and secondary schools.

Initial topics (gathering and organization of data, data representation and interpretation, measures of central tendency and probability calculation) are taught in primary school. In secondary school, students might be introduced to more elaborate concepts such as inductive statistics.

Recent reflexions on the usual introductory courses in statistics lead us to the introduction of projects that take advantage of the complementarity in relation to the classic concept of the lesson, satisfying the new paradigms of teaching statistics.

Data collection and analysis is at the heart of statistical thinking. Data collection promotes learning by experience and links the learning process to reality (Snee, 1993). Developing the students' statistical reasoning consists in incorporating active-learning strategies that make it possible to complement what they have already heard and read on statistics.

One of the main advantages of using data and projects (with oral and written reports) as a supplement to theoretical lessons is that students take an active part (Smith, 1998). It also allows you to show them the power, elegance and beauty of statistical reasoning and involves making interpretations based on sets of data, graphical representations and statistical summaries. Much of statistical reasoning combines ideas about data and chance, which leads to making inferences and interpreting statistical results.

In this chapter, we analyse the importance of statistical literacy for the education community and suggest improvements for curriculum development. We compare different approaches to teaching and make a short review of the curricula in three different countries—the United States of America, England and Portugal. We also bring in the paradigms of the teaching of statistics.

We then present the power of statistical projects as the basis for statistical thinking and reasoning. After that, we introduce an idea about who should influence the development of the curriculum in statistics. We explore the importance of statistical training for teachers, as well as tools and materials for the education community. We then present the conclusions.

A. Statistics education: an overview

Statistics education has been seen in a variety of perspectives. Ponte and Fonseca (2001) recall that in England, statistics was included in the curricula of secondary school mathematics in the late 1950s, closely linked to the study of probability and oriented to the theory (with special emphasis on the study of hypothesis testing). Later, it was included in primary-school curricula, focusing on graphical forms of representation and on central location measures (Holmes, 2000).

In the late 1970s, a major curriculum-development project appeared in England, where statistics was essentially viewed as "working with data". The guidelines for this project were to be fully considered in the so-called "Cockcroft report" (Cockcroft, 1982) which, in turn, came to constitute a decisive influence on the English National Curriculum. Later, this approach also became notable in the curricula of other countries.

Several countries made changes in their curricula to adapt mathematics to meet statistical literacy. Ponte and Fonseca compared different approaches to the teaching of statistics in Europe and highlighted three major trends:

- Emphasis on the process of data analysis from the perspective that this science is used in society, taking into account that the use of data is part of everyday life (mainstream in countries such as England).

- As a chapter of mathematics, sometimes referred to as "stochastic analysis", emphasizing conceptual or computational approaches (for example, in France).

- As an auxiliary tool for the study of various topics and school subjects, including geography and biology (this trend is visible in Sweden, for example).

In their work, Ponte and Fonseca focused on the curricula of the United States, England and Portugal, and saw the following as the main similarities and differences:

Exploratory data analysis

- American and English curricula point to the importance of understanding the characteristics of a global data set, whereas the Portuguese focuses much on measures of central tendency (mean, mode, median) by the end of the third cycle.

- Comparisons between two or more sets of data are emphasized by the National Council of Teachers in Mathematics (comprising the United States and Canada) starting from the second stage of elementary school curricula, whereas Portuguese and English do that in the third cycle.

- In secondary education, the National Council calls for a more or less in-depth study of bivariate data (including linear, exponential, quadratic functions -

that best fit a given data set), whereas Portugal only suggests an intuitive graphical approach of two-dimensional distributions.

Inference

American and English documents emphasize the need to draw conclusions from the second phase of the elementary school and "key stage" 2, while other countries refer to it in the third cycle. The curriculum of many countries makes no reference to the development of inferences (although the National Council and the English programme advocate the development of concepts of statistical inference in some phases of the elementary school and later).

There's a lack of consensus about introducing inferential aspects in the curricula of elementary and secondary schools. This is because the teaching of statistical inference is usually preceded by the introduction of essential concepts (e.g. random samples, estimator theory, hypothesis testing), for which some mathematical background is needed. However, students should understand, from middle school, the use of samples in order to draw conclusions to populations.

Roiter and Petrocz (1996) also analysed the curricula of several introductory courses in statistics. They claim that there are four paradigms in teaching statistics: statistics as a branch of mathematics; as data analysis; as experience planning and as a problem-based matter.

Ben-Zvi and Garfield (2004) note some challenges that teachers face in teaching introductory courses in statistics. Therefore, if data aren't structured, this may hamper the interpretations based on different assumptions.

B. Main challenges

It's essential to adopt the paradigm of "statistics as a problem-based matter". This perspective allows one to organize the course as a series of applied problems that could be taken from the news or problems with a statistical content found in the mass media.

The Curriculum and Evaluation Standards for School Mathematics of the USA, published in 1989 (NCTM, 1989) introduced rules on probability and statistics for all levels of education. On the basis of these, the current guidelines on teaching mathematics recommend a strong development of content, concepts and procedures which should acquire a greater degree of development, so that at the end of secondary school, students have a sound knowledge of basic statistics.

To understand the fundamental ideas of statistics, students should work directly with data (Campos and Oliveira, 2010). Analysing the data and studying probabilities will provide them with a natural environment to set up connections between mathematics and other subjects and their everyday experience.

Happily, in recent years, the teaching and learning of statistics has become more practical and interactive. One reason for this is that the paradigm of statistics pedagogy has changed in the last two decades. Statistics is more than a branch of mathematics supported by data analysis: it involves experience planning and

problem-based matters that need careful thinking and reasoning (Garfield, 2002, Garfield and Gal, 1999, Moore, 1992, 1998).

The failure of many introductory courses in statistics has led certain authors to the belief that the courses should be redirected—from mathematical technique to data analysis (Oliveira *et al*, 1999). There are also those who defend changes in teaching methods, replacing passive lessons with lessons in which the students take an active part.

As a supplement to theoretical lessons, the use of a sequence of collaborative projects with oral and written reports on the results obtained is one of the solutions tested (Smith, 1998). To demonstrate the power, elegance and beauty of statistical reasoning, if you use a wide variety of realistic examples, you can persuade students that they're using critical thinking skills that may be applied on a daily basis and in any profession.

Many authors have discussed the advantages and disadvantages of comparing the data produced by the students with the analysis of data produced by others. The problem with examples produced by others is that the students remain passive and don't experience firsthand the questions and problems that arise from collecting and analysing data.

It's better, therefore, to let the students manage their own data. Activities in the form of a project give them experience in formulating questions, defining problems, and formulating hypotheses and operational definitions. The students also learn how to plan experiments and surveys, collect data and, how to best deal with measurement errors, draw up data summaries, analyse them, communicate results, plan experiments and correlate the ideas suggested by the discoveries.

Learning by doing should be supplemented by the written and oral presentation of results. Writing about a subject can reinforce understanding. Presentations should include the goals, details about data collection, inferential processes and questions or reservations concerning the conclusions.

We believe that projects create the conditions necessary to improve statistical literacy, as they enable the interaction and proactively reinforce the understanding of statistical concepts.

C. Ideas, tools and materials to influence curriculum development

Who takes part?

Curriculum means different things to different people. Andy Begg (2004) argues that there are situations where it means the official curriculum, the planned curriculum, the school scheme, individual teacher's lesson plans, or textbooks. He presents an idea about who should influence the development of the curriculum in statistics. He includes statisticians, teachers, employers, socials scientists and students as possible "voices" that contribute to curriculum development.

Table 1. Interested groups and their possible contributions[1]

Statisticians	Ensure school statistics accurately reflects professional practice
Employers	Ensure that future workers will be statistically literate
Parents	Address needs of citizenship in an information-filled age
Other teachers	Ensure that statistical needs in other subjects are met
Social scientists	Ensure the cultural acceptability of curriculum ideas
Learners	Ascertain whether the curriculum is meaningful for them

We suggest two additional voices in this set: the employees and ourselves, the statistical organizations. Former students that are now our employees constitute active voices by suggesting new ideas for curriculum development. They probably know what statistical concepts they need to manage in their actual tasks. As statistical organizations, we can also act as contributors, since we already offer tools and materials to encourage the improvement of statistical literacy, as we'll see later in this chapter.

Among all these voices, teachers play a very important role. It is therefore essential to reflect on how they should be taught.

Teaching teachers

According to Branco (2000), we need to be aware of the difficulties and successes that teachers and students experience in teaching and learning statistics.

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[1] Begg, 2004

Quintas, et al (2009) conducted a survey where it was found that teachers recognize the need for training in statistics, especially with regard to the realm of didactic knowledge.

Example

Several educational courses were subsequently created (Peck and Gould, 2005). INSPIRE (Insight into Statistical Practice, Instruction and Reasoning), comprising both a face-to-face component and a significant online component, was a year-long course for secondary school teachers of statistics. It was designed jointly by the American Statistical Association and two universities (California Polytechnic State University and University of California, Los Angeles). A grant from the National Science Foundation supported course development and course delivery for the first two years.

The main goal of the project was to create a unique professional-development experience for secondary-school teachers that would:

- provide them with the necessary background to teach introductory statistics

- help them to incorporate real data, active learning and technology in teaching introductory statistics

- provide access to a variety of resources for teaching statistics

- create a community of learners who would advise and support each other in matters of classroom practices, pedagogy and understanding of statistical concepts.

Tools and materials

Nowadays, resources are available worldwide at the click of a mouse. Many statistical organizations have developed clear educational strategies. Statistics Canada, for instance, developed several resources such as access to a selection of electronic data, and a page with the statistical profile of Canadian communities. They also provide learning resources for teachers and students, and have a "Kids' zone" in their web page.

Other organizations, such as the Australian Bureau of Statistics also have web pages intended for secondary-school teachers and students. Statistics New Zealand includes the "Schools corner", where you can find applications built to provide a flexible way of visualizing the complex tables that result from the Census of Population.

In the United Kingdom, the Office for National Statistics has an education strategy that includes the creation of a group made up of people from the Office, teachers, assistants, students and trade associations with a view to contributing towards bringing the Office and schools closer together.

In Portugal, a project called ALEA (Local Action of Applied Statistics) aims at providing both teachers and secondary-school students with teaching materials for the study of statistics.

Conclusions

The teaching of statistics in elementary and secondary schools is one means of improving statistical literacy. The paradigms of teaching statistics have been changing over the years.

Statistics is now being seen as a problem-based matter, which implies that statistical methods are used to organize the course as a series of applied problems that could very well be taken from news items with a statistical content found in the mass media. Therefore, data collection and analysis is the heart of statistical thinking and reasoning because it promotes learning by experience.

In order to contribute to and influence curriculum development, we suggest that employees and statistical organizations, as well as statisticians, teachers, employers, social scientists and students, should get involved.

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VI. Statistical literacy for respondents, businesses and the general public

General public

For a better society, citizens need to be literate. And numeracy is now considered a key element of literacy. After arithmetic, which is used for regular financial transactions, statistics is the component of functional numeracy with which the general public has the most contact. Every day, adults receive political, commercial, financial and ethical messages that are connected to statistics. We, the national statistical organizations, produce many of those statistics.

We tend to rely heavily on journalists as intermediaries to capture the attention of the public and to popularize statistical studies, making our facts and figures relevant and understandable by incorporating them into human-interest stories. The duty to acquire the skills to evaluate media stories critically, however, rests directly with our citizens. Author H.G. Wells noted over 70 years ago: "Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write." This prediction has become true in our time.

Responsible citizens shouldn't be afraid of numbers or statistical terms. But they should be able to understand clearly why statistical information is needed, how reliable statistics are gathered, what's meant by basic statistical ideas such as averages and how to interpret graphs and charts that appear in the media.

Citizens need to be statistically literate so they can think critically, challenge the veracity of numbers in the media and correctly interpret an article or debate that is based on statistics. Some of these skills are being taught at school, as statistics has become integrated into the mathematics curriculum from the earliest grades. School training, however, has long-term outcomes, as the students of today become the citizens of tomorrow. Educators should not be expected to shoulder alone the statistical literacy development of future citizens.

Also, today's adult public may have missed out on a statistical education when they were at school. They need to know more about how studies are conducted and data are analysed in order to comprehend the terms that media use in describing the results of studies. We, as statistical organizations, can lend timely support to this public education.

Promote statistical literacy

Our mandate is to provide official statistics that so that governments, businesses, communities and individuals can make informed, evidence-based decisions. We provide this service by offering access to reliable, relevant data. Most of our organizations have made their websites their primary distribution mechanism.

With new technologies—including robust search engines, dynamic publishing, animated data display and data visualization, and with hyperlinks to metadata, paradata and definitions—the public has direct access to massive amounts of official information online. While media continue to be a key and trusted distributor of our data, we can also proactively share our considerable statistical

expertise directly with the general public. We can improve public statistical literacy by enabling a better understanding of statistical concepts so that citizens may get more value out of the data we collect and distribute and be better informed and participate more fully in societal debates.

Helping people develop an awareness of the importance of statistics and how they can be applied to their advantage is the first step in statistical literacy. Citizens should be able to understand how official information is used to monitor the tremendous changes happening, the challenges our world is facing and the impact those changes have on each and every one of us.

Explain why statistics are needed

We should build awareness through materials that explain how timely statistics help citizens understand their country. Many groups depend on statistical information. Unions negotiate collective agreements using statistics on average salaries of various occupations in different industries. Advocacy groups arm themselves with statistics to press for change and to keep business and governments accountable, for example, in the area of greenhouse gas emissions and international commitments. Educators follow the latest statistics on topics in their field to shed light on emerging trends.

Governments monitor the changing picture of the country's economy, society and environment. They use statistics to design, evaluate and improve their programmes and policies. For example, a government needs to know the number of seniors and children in order to plan financial assistance programmes and services such as senior citizens' homes, schools and day-care centres.

Informed decision-making depends on the accurate and objective information that we collect and disseminate.

In practice, informed decision-making can save a lot of money—for example, by helping to target government spending accurately. It can also lead to lifesaving breakthroughs in medicine, and can help conserve the earth's natural environment. By becoming aware of the importance of statistics to their daily lives and able to access relevant information in an understandable format, people will come to understand better the numbers that statistical organizations produce.

Encourage public understanding of numbers

Every major data release we publish should include analysis, charts and tables that tell the story in the numbers, as well as information on methodology that explains how the data were collected. Data releases should explore relationships, causes and effects, and place significant findings in the context of long- and short-term trends and of the broader economic or social environment.

We can gently introduce the public to the basic terms and concepts used in the world of data by pointing them to definitions and supporting resources. Several statistical organizations have sections of their websites that support public statistical literacy and explain statistics: an excellent example is the Australian Bureau of Statistics (ABS) section called *Understanding Statistics.*

www.abs.gov.au/websitedbs/a3121120.nsf/home/Understanding%20statistics?opendocument#from-banner=LN

Here you can find information on *Why Statistics Matter*, *Frequently Asked Questions*, a *Blog* about statistics, *Statistical Language* definitions, *Video Tutorials* that explain how to use ABS information and an online course *An Introduction to Statistics,* which covers basic concepts and principles.

The first World Statistics Day in October 2010 was the driver for other organizations to produce online products that make the public more aware of statistics. Here are some examples:

From Statistics Canada, *Statistics are Important!* is produced primarily for the student market. www.statcan.gc.ca/edu/edu06/edu06f/edu06f_0003-eng.htm

Through interviews with international statistical experts, answers are given to questions such as "What's the use of statistics?", "Why learn with statistics?" and "What is statistical literacy?" Information about Careers in statistics is offered, as well as links to Statistics: Power from Data, an online resource that explains the steps in producing data—from collection to analysis to display—with examples and lessons.

From the United States Bureau of the Census, an animation *The Great Apportionment Machine* explains how Census data are important and used in the apportionment formula to ensure equal representation for all citizens in their political system. http://2010.census.gov/mediacenter/census-data/census-apportionment-machine.php

Products that explain statistics

From Finland: E-Course in Statistics:

http://tilastokeskus.fi/tup/verkkokoulu/index_en.html

From Italy: *The Worth of Data* http://www.istat.it/servizi/studenti/valoredati/

From Japan: *Welcome to the World of Statistics*, a video

www.stat.go.jp/kids/teacher/video/html2/video.htm

From Eurostat: *Statistics Explained,* a guide to European statistics

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Main_Page

As people learn to better understand and use data, they can also provide informed feedback about data-collection activities in their community. Their feedback helps in understanding the context in which data are collected and disseminated.

Many if not most of our statistical organizations are using technology to do online consultations with the public. We network and have interactive discussions through blogs and social media.

Respondents

A positive public image is created through the broad dissemination and analysis of "official" statistics, provided they are relevant, accurate, neutral and easy to use. This positive image helps to secure stakeholder support for the continuation of statistical programmes and to promote the collaboration of survey respondents.

As statistical organizations, we have an interest in creating an appetite for our data and helping citizens learn how to interpret and use data. Statistically literate citizens will recognize that timely and accurate survey responses are linked to more relevant data outputs, which in turn support the policies and programmes that affect their daily lives.

Public statistical education promotes a better understanding of the statistical system so that people will become more willing to respond to surveys. Many of our statistical organizations wouldn't be in the business of producing and distributing data without the cooperation of survey respondents and other partners.

When an agency collects information from the public, its website should include a section that tells survey respondents about the importance of their participation. An example from Statistics Canada, including a very friendly video explaining the importance of survey participation, can be found at:

www.statcan.gc.ca/survey-enquete/index-eng.htm.

But the survey environment is becoming increasingly complex. Not only are respondents more difficult to contact and more heavily inundated by public polling and market surveys, but there appears to be a greater sensitivity to any intrusion of privacy. For this reason, we must explain privacy and confidentiality practices in detail. We can get higher response rates if we assure respondents of privacy and confidentiality and if we inform them fully about why we're collecting the data—especially for surveys that are likely to have a direct impact on their lives or the well-being of their community.

For example, surveys with high response rates, such as those about health, literacy and child development, typically have good respondent relations materials and are supported by community groups and associations.

We can often obtain considerable goodwill from respondents when associations publicly support and justify our surveys and help disseminate their findings. This active support is crucial, given the privacy-sensitive environment and the requirement that the information be relevant to a significant programme, policy or research issue. Outreach and relationship-building with associations or cultural groups can be undertaken through providing seminars, talks, and workshops and tailored communication materials.

Explain the why and how of data collection

Explaining to survey respondents why they should participate is the first step in their statistical awareness and can lead to more advanced statistical understanding.

It's good practice, and in many of our statistical organizations it's the policy, to provide all respondents with the following information before or at the time of collection:

- Purpose of the survey (including the expected uses and users of the statistics to be produced from the survey)

- Authority under which the survey is made

- Collection registration details

- Mandatory or voluntary nature of the survey

- Confidentiality and protection, any record linkage plans and the identity of the parties to any agreements to share the information provided by respondents.

In addition to the survey instrument (i.e. questionnaire or computer- or telephone-assisted interview script), you should provide the respondent with such materials as a letter of introduction, brochure, newsletter, questions and answers or online survey documentation.

The following is an example of a survey's statement of purpose for respondents. While this information may be provided in a letter of introduction or brochure, we recommend that you include it directly on the questionnaire as well; or, for telephone and personal interviews, that it be given verbally at the time of the interview.

> "This survey collects essential data to produce statistics on the construction industry and on the national economy. Aggregated industry information is used by private industry participants and trade associations for performance measurement and market development and, in addition, is required by governments for national and regional economic programs and policy planning.

> "While participation in this survey is voluntary, your cooperation is important to ensure that the information collected in this survey is as accurate and as comprehensive as possible".

Statistical organizations should also highlight in a friendly way in all communications with respondents the availability of more information that explains the "big" statistics picture. For example:

You're sitting at home, or at the office.

It's quiet, it's calm, it's - perfect.

Suddenly - the doorbell rings, the phone sounds, or an email arrives out of the blue.

In fact, it's the statistical agency and we're going to spend the next few minutes helping you understand why this is good news.

Imagine being the person who has to decide these things:

- *Where to put that new school?*
- *Whether that new road should be two lanes or four lanes?*
- *How many police cars, ambulances, or park benches do we need?*
- *How will interest rates, salaries, prices, and other key financial indicators be calculated?*

Here are some suggestions for approaching this:

...We want a little of your time and a little of your information.

We need it so the government can make good decisions about you, your family, your community, and your work life as well.

We respect and value the time you give us, and we won't waste it.

We can also help support respondent relations and statistical learning if we:

- Return the results or numbers to survey respondents in a way that makes them easy to understand, such as in an analysis that highlights nuggets of information from among the mass of data collected.

- Give people information they can use, while letting them know what statistical organizations do. Some of our organizations distribute copies of press articles using data that they collected through previous surveys. Typically, figures reported in the press are analytical. By making repeated reference to the statistical organization as the source of this analytical information, we keep it in the public mind. During collection activities, people understand almost instinctively that this information is important if they see it used in a media article. Give them a copy of real articles.

- Develop and distribute good respondent materials that explain the importance of data and of respondent participation, on topics such as "The Why of Business Statistics", "The Fair Collection Practices" and "The History of the Census".

Example

The *Canada at a Glance* brochure www.statcan.gc.ca/pub/12-581-x/12-581-x2010000-eng.htmpresents contains current Canadian statistics on demographics, education, health and ageing, justice, housing, income, labour market, households, travel, national economy and finances, agriculture, international trade and the environment.

Used as a respondent-relations tool, this envelope-sized brochure serves as a reference for people who want quick access to current Canadian statistics and key international comparisons. It's included with paper questionnaires sent to respondents, and more than a million additional copies are printed every five years to support the collection of the Census.

To assist in reaching respondents, to develop their statistical literacy and to help them understand the statistical process, survey-support materials should clearly communicate the benefits of completing the surveys.

And when respondents use electronic reporting options, they should be linked directly to previously gathered data. In this way, they could compare themselves to the national or community-level summary results and see themselves as relevant to the data and data-collection activities and as part of the whole. Respondents who have an interest in knowing more about statistics could link to online learning materials developed for the general public.

As a statistical organization, our prime assets are our credibility, relevance and visibility. High visibility and positive media coverage reinforce credibility, which in turn motivates respondent participation. Consider every communication directed to survey respondents as an opportunity to encourage a better understanding of the statistical system and its outputs, and to highlight the importance of statistical programmes.

Business

In today's global economy, data are increasingly the lifeblood of business. They're used for strategic planning, new market exploration and expansion. Business people need up-to-date statistics on how industries work and on the goods and services they produce. They need demographic statistics to determine the right location for a new business and to help reach the right market.

When preparing a business plan, entrepreneurs consult statistics on the sales of their type of product or service, and evaluate the competition using statistics on similar businesses in the same geographic area.

Businesses are also major contributors to the different data that statistical organizations collect to feed the gross domestic product—an international measurement of a country's economic well-being.

Since businesses are involved in both the supply and demand side of data, there's good reason to invest in statistical-literacy activities that invite accurate business reporting and that build awareness and effective use of statistical information among the business community.

Outreach to business

To provide a deeper understanding of data for non-experts, many of our statistical organizations (e.g. Australia, Canada and New Zealand) offer workshops. The workshops typically vary in length from one to three days. They're targeted at business, market researchers, analysts, advisors and scientists or anyone who conducts a survey, is a data user or needs to develop the ability to assess and interpret survey results.

Workshops include titles such as "Know your region", "Surveys from start to finish", "Turning statistics into stories", "Understanding and interpreting data" and "Introduction to basic statistics".

From Australia:
www.abs.gov.au/websitedbs/d3310114.nsf/web_pages/23E69B515C586A7ECA25
7188001D2EA5

From Canada: www.statcan.gc.ca/cgi-bin/workshop/wst.cgi

From New Zealand: www.stats.govt.nz/tools_and_services/services/outreach-and-liaison/outreach.aspx

By collaborating and building relationships with stakeholders within the business sector (including those that service the business sector, such as statistical societies) you can increase the exposure of your data and services on various business websites. These websites redistribute relevant information to their members and clients and provide a seal of approval for your activities. Stakeholders include the federation of independent business, chambers of commerce, manufacturers and exporters, bankers associations, investment industry associations, institutes of actuaries, and retail councils.

If you attend major conferences or events organized by national business groups, you help raise awareness about statistical programmes and you may develop business leads or ideas for partnerships. Being visible, interacting with business and understanding the environment in which they work are the best ways for you to produce products and services that will assist them. You could also include in conference registration packages brochures that explain the importance of statistics to the economy and how businesses can use these statistics to their advantage.

Another useful thing to do is to set up a speakers programme, whereby you send expert speakers to Executive Masters of Business Administrationclasses (E-MBA), business courses at university level or conferences. You should develop consistent messages to include in communication materials for these speakers.

Making statistical information accessible helps business users understand it and use it to inform debate, research and make decisions. Your organization should develop specific and relevant cases studies and examples for this purpose.

A good example of case studies that show business how to use data can be found on a new section of the Australian Bureau of Statistics (ABS) website called *For Small Business. An online brochure _Planning for Business* provides tips on how to use ABS information in order to know your market, locate potential clients, target promotions, grow your business, support your business case and more. www.abs.gov.au/ausstats/abs@.nsf/mf/1391.0.55.001

Use new technology to reach business people who want to receive relevant information and services "just-in-time". This demands more involvement in push distribution, social networks and more frequent information updates. New services from statistical agencies such as RSS feeds, Twitter, Linked-In, Widgets and Apps for mobile devices are becoming increasingly common. Dynamic visualizations of data prepared for business can tell a story at a glance and are useful, for example, in helping people understand economic indicators.

More data, enhanced skills required

Besides responding to client questions, you should look for opportunities to explain your products and services to existing or potential users, respondents, business and the general public. This can be done through educational programmes for specific communities which include targeted talks, workshops, and communication or training materials. Or it could be done through an enhanced website that includes data, metadata and analysis, case studies and tutorials.

You should also think about the power of social networks and their ability to build informed user communities. Part of the mandate of a statistical organization should be to help citizens understand issues and to actively support the development of their data interpretation skills. In this way, you can grow a more knowledgeable stakeholder base.

More and more government data are being made available free online. This enhanced access will encourage the construction of new and useful data products and further dissemination of official statistics to a broader segment of society. As a statistical organization, therefore, you must change the way you approach the public to enable the layperson to better understand the results obtained by statisticians. This will support the viability of your statistical programmes in the long term and reward the global community by enhancing its statistical literacy. Statistical literacy is an important ingredient of democracy.

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"Train to Gain", Mary Townsend, Paper prepared for the 2008 Conference of European Statisticians.

Australian Bureau of Statistics website, *Planning for Business*, brochure online www.abs.gov.au/ausstats/abs@.nsf/mf/1391.0.55.001

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Australian Bureau of Statistics website, *Understanding Statistics* www.abs.gov.au/websitedbs/a3121120.nsf/home/Understanding%20statistics?opendocument#from-banner=LN

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Statistics Canada, *Canada at a Glance*
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http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Main_Page

VII. Improving statistical literacy within statistical organizations—training your workforce

The true strength of any organization is its staff. An efficient statistical organization cannot operate without first-rate people. The quality and vitality of our statistical programmes rely on engaging the finest and most talented recruits and investing in continuous learning for employees to build capacity at all levels of the organization.

Because it takes more than just statisticians to make a statistical organization function, all employees, including administrative and support staff, should be sensitized to the activities connected with collecting, processing and distributing f the data and have at least a basic level of statistical literacy.

To foster the recruitment, retention and growth of our "strength", a broad spectrum of learning opportunities must be made available, from basic statistical skills to advanced methodologies. This chapter covers the different aspects of capacity-building within statistical organizations. It includes training current staff, new recruits, the future workforce. It also deals with training by retirees and training by staff in other countries and international organizations.

A. Train your future workforce

Of the many purposes that education serves, an important one is to prepare people for work. Most statistical organizations attempt to recruit the best and the brightest graduates from post-secondary education institutions to fill the important jobs of analyst, statistician and methodologist.

Some countries' organizations find it hard to get skilled professionals from the educational system to fill these roles directly. Why? Because there's a difference in preparing a post-secondary student for a role in government or "official" statistics as opposed to the "general" statistics that's most often learned through the educational system. The traditional mathematics and statistics department in major universities doesn't always offer a full suite of courses in sampling, methodology or survey statistics.

Also, much of the course work in mathematics and statistics is abstract. And since university professors often make their academic reputations in statistical theory and not applied statistics, the academic training of statisticians isn't always relevant to the skills required by our organizations. We look for recruits who:

- are technology literate and can use computer programs

- have a blend of training in both the theory and the application of statistics

- have the statistical skills to produce analysis of real world issues

- can communicate their results effectively in written text.

To close this skill gap, students in statistical courses at the post-secondary level should get more involved in hands-on statistical consulting. They should also be encouraged to work during school breaks at a statistical organization. If found to be productive, they may be integrated directly after graduation to full-time work in the areas of the organization where they have already gained experience.

Interaction should be encouraged between academics and government statisticians, including with temporary exchanges of personnel between government agencies and universities. Course lectures and public speakers can be provided in specific topics by government statistical experts.

To foster the use of official statistics and to enable applied research and analysis while students are in university, you could provide better access to government statistics through university libraries. New products designed for the university market can be jointly developed and made available. Prizes for the best paper by a student in statistical analysis using official data could be awarded to get students interested in the broad range of data collected.

Similarly, prizes for the best data visualization or modelling project could be offered to encourage innovation in prospective statisticians and to demonstrate the use of new technology for real statistical applications.

In the best-case scenario, specific training would be provided by the university to help prepare students for careers in government statistics. For this, you must find ways to network with academics to implement pre-determined courses that might lead to a certificate in official statistics.

In your courses on government statistics, you should include topics on:

• Data relevance, the need for new data for policymaking

• Confidentiality and privacy in collection practices

• Dissemination and metadata compilation

• Longitudinal surveys for data comparability across time

• Burden on respondents

• Data access and control and cross analysis.

An example of a country that has set up an "official statistics" stream at a university is New Zealand. An adjunct professor has been appointed who works part-time at Statistics New Zealand and manages the official statistics courses at the University of Auckland. The preparation of statistical students for careers in government then is a shared responsibility and the salary and activities of the adjunct professor are supported both by the university and Statistics New Zealand.

B. Train new recruits

Our organizations are learning organizations just by the nature of the work we do. We employ highly skilled labour generally recruited from other government departments, research organizations and for the most part from post-secondary institutions. We recognize that it's impossible for an academic institution to produce exactly the correct skills in a graduate that a statistical organization desires. It's therefore up to us to mould the new recruit into the employee we want. This we can do in three steps.

Step1: Assign a mentor

A new employee should not be left to flounder, not knowing his or her role or what to do. A mentor or coach should therefore be assigned to each new recruit to provide guidance, share their knowledge and offer advice and assistance when needed and to help choose the correct training required for the recruit to achieve success.

Step 2: Provide a structured development programme

New recruits should be placed in a structured developmental programme that helps them rapidly acquire the skills and broad experience within the statistical organization. Development programmes can include work assignments interspersed with periods of statistical training. The best programmes are based on action learning.

An example of action learning is a rotational assignment. These are collaborative in nature and enable applied training and expose recruits to some main statistical functions.

Functions include research, surveying, modelling, analysis, compilation of the national accounts, etc., as well as some subject matter areas: such as labour, demography and population, international trade, business statistics, service industries, national accounts, health or crime statistics, income statistics.

Rotational assignments stress the importance of actually doing the work and provide the opportunity to solve real problems. They result in the integration of skill and knowledge.

Step 3: Offer a career path and learning plan

Every new recruit has their own unique mix of professional, career and personal goals and priorities. Recruits should be guided to explore a career path. A statistical career path lays out the opportunities that may present themselves as the recruit work towards his or her career goal. It provides a general sense of the skills that could be required at various levels in a career in statistics in the organization. A career path document is a career planning reference tool that outlines the experience, knowledge, abilities and training that is needed to have to progress within a specific statistical domain.

New recruits can use the career path document as a baseline for helping to develop a learning plan that addresses their current job needs and future aspirations. For example, if new recruits wanted to be involved in business

statistics, they should ensure that they get some experience in developing, collecting, processing, analysing and disseminating statistical business information such as trade data, price indexes, transportation and service industry data.

Beyond the generic statistical training such as survey-process training, a new recruit interested in the business domain would choose relevant courses such as business financial accounting, basic concepts of the business register system and business survey methodology.

C. Train your current workforce

To make our data relevant, understandable and useful, we need a dedicated workforce that makes "quality" a core value that's applied in day-to-day activities, processes and standards. And to uphold a reputation of relevance and remain trusted by a wide range of stakeholders, we must invest heavily in our employees' continuous statistical learning.

Re-engineering, changes in the workplace and the emergence of new and better technologies have fuelled the need for lifelong learning in statistical organizations. Through continuous learning, employees gain a wider and deeper understanding of the core business of statistical organizations and can upgrade the skills that are required to implement new practises, standards and processes. It is important then that employees are offered work related learning for vitality and competitiveness of both the individual and the organization.

Since employees acquire and assimilate knowledge through diverse learning experiences, you should offer a blend of formal and informal learning activities. These could include:

- Structured in-class courses either provided by trainers at your organization or in partnership with academic institutions, computer-assisted courses or e-learning, external learning through university diploma or certificate programmes, some of which can be financially sponsored, or education leave provided.

- Networking opportunities, conferences in specific subject areas, information sessions, presentations and workshops.

D. Training your general staff

Different sections and different employees within the organization have different needs. Staff in subject matter areas, for example, must have a higher level of skill and statistical competency than those in general administration. Nonetheless, all staff should have some level of statistical training so that they can understand the basics of the processes in a statistical organization.

Not everyone is expected to understand the in-depth daily activities of statisticians but some elements in statistical knowledge which are universal. For example, to be an informed citizen, you need basic statistical concepts. In this information age, every employee who has come through the school system with at least some secondary school learning should already have a good understanding of:

- Why data are needed and how they are produced

- Basic terms and concepts related to data such as averages

- How to interpret a table or graph

- How statistical conclusions are reached, and how inferences and analyses are made.

You can offer courses to review this information or to train general staff either formally or informally, in groups in a classroom, or through asynchronous learning on computers done at the pace of the employees in their own time in their own environment.

Everyone has their own personal learning style. We recommend a blended approach of statistical training such as a combination of classroom training, workplace learning, computer-based learning, conferences, special events, roundtables and seminars.

We also highly recommend computer-based training or e-learning for general staff where the technology is available. This kind of training involves using a computer to share information and to support learning. E-learning is an effective means of transferring knowledge by combining visual effects, hand-on practice exercises, audio, simulations of the actual application being learned.

Several statistical organizations have developed e-learning or online learning courses about statistics and surveys which can be used by general staff to revisit or upgrade their learning.

The International Statistical Literacy Project website lists examples, among them:

Finland - E-course in Statistics

Australia - Introduction to Statistics

Canada - Statistics: Power from Data!

An excellent example of an applied course prepared for general staff and provided in the classroom is Statistics Canada's Survey Skills Development course.

Example: Survey Skills Development course

This six-week course is designed to provide participants with knowledge and the skills in survey-taking. It targets employees who have little training or experience in the design and implementation of surveys. It's based on action learning principles: participants design and conduct an actual survey under real-life conditions. The final two weeks of the course are off-site where the survey is run.

Through this action learning, participants:

- Develop an awareness of the policies, principles, issues, complexities, and interrelationships inherent in the design and implementation of a statistical survey

- Develop basic skills of survey-taking through practical experience

- Acquire knowledge of survey methods and procedures and of how these are applied by the major survey-taking areas of the department

- Learn how to work with others in an interdependent framework towards a common objective

- Build a network of friends and colleagues at different levels within the organization.

When new or special skills are required

A challenge for any statistical organization is to maintain a high-level statistical capability within the organization. Competing careers, international portability of skills and the global marketplace mean that many of our organizations are losing knowledge workers to other countries or organizations. Rapid and significant changes in technology have dramatically increased the need for most of us to retrain our existing employees or to renew and adapt previously acquired skills.

Classroom courses and workshops that run from half a day to several weeks can provide basic and advanced training on generic topics such as:

- Survey design and development

- Questionnaire design

- Sampling

- Data analysis

- Time series methods

- Non-response

- Imputation

- Quality assurance

- Interpretation and presentation of data.

Courses that are job specific could include topics like:

- Collection entity customization

- Seasonal adjustment

- Small area estimation

- Introduction to record linkage

- Modelling and forecasting of time series

- Indirect sampling for difficult to reach populations.

As well, for countries that undertake a census, the relevant training needs to be developed and offered to staff. Often, employees working on a census are hired for a definite time period and require a special skill set, especially those working in the field.

Many statistical agencies offer e-learning courses on census roles, duties and explaining census variables and geographies. Special courseware packages standardize the training provided for the different roles involved in a census. For the dissemination of census data, dedicated census training staff give subject-matter specialized courses, census-related tool courses and advanced tool courses.

Education leave

Our organizations typically do not teach the science of statistics. We leave that to schools and universities. But we do facilitate the learning of the processes and knowledge that go into the production of official statistics.

Education leave is another programme that offers an opportunity to help with developing the statistical competencies of our employees. Statistical organizations that commit to strengthening and broadening the skills and expertise of employees to meet future needs can actively encourage and support the efforts of employees to improve and enhance their professional qualifications and accreditation through formal education.

To encourage and assist employees who are prepared to invest in their own development, the reimbursement of tuition fees and related course costs, in whole or in part, should be considered for courses taken by employees outside working hours when these courses contribute to developing employee skills and qualifications that are beneficial to your organization.

E. Training by retirees

Economists like Paul Romer believe that knowledge and human capital can yield infinite outputs. How we capture, nurture and value the abundant knowledge and human capital of the experienced employees who have recently retired is important to the continuity of some statistical programmes.

Knowledge gaps can be directly filled by hiring recent retirees to work on a contract basis to pass along their historical knowledge and specialized experience through workshops and training to current and new employees. New retirees can also write training materials for current employees. They can also help to optimize a project, develop programmes, help transfer skills and expertise and improve our organization's flexibility to handle peak-workload periods.

F. Statistical training of staff in international organizations

With steadily increasing interdependence among countries, improvements to any one country's statistical system benefit the world community. A deeper understanding of the statistical problems of developing countries also helps a country effectively carry out its responsibilities in the United Nations Statistical Commission and similar international bodies. Sharing a well-designed statistical training and assistance programme will strengthen the international statistical community.

We can provide statistical education and training courses to developing countries and to international organizations. The purpose is to transfer expertise and provide lasting capacities in specific target areas.

Some examples of statistical training assistance include:

- Project missions abroad

- Study tours

- Training manuals and workshops created for another country

- Providing statistical e-courses and software training to developing countries.

These activities contribute to increased knowledge and self-reliance among the assisted organizations' staff. The training courses prepare staff to continue performing the work required by the project, on their own, after the assistance ends.

Some bilateral agreements between statistical agencies can last for several years. For example, from 1996-2001, Statistics Canada assisted China's National Bureau of Statistics in reforming their statistical system to meet the needs of a socialist market economy. The cooperative project improved the collection, analysis, use and dissemination of statistical information in China. It also addressed organizational development, market economy measurement, technical capacity-building and management. Employees from both of these national statistical organizations participated in the training courses. One of the texts used in the

workshops was *Survey Methods and Practices*, catalogue 12-587-X. www.statcan.gc.ca/pub/12-587-x/12-587-x2003001-eng.pdf

This publication shows how to design and conduct a census or sample survey. It explains basic survey concepts and provides information on how to create efficient and high quality surveys. It's aimed at persons involved in planning, conducting or managing a survey and at students of survey-design courses. It contains the following information:

- How to plan and manage a survey

- How to formulate the survey objectives and design a questionnaire

- Things to consider when determining a sample design (choosing between a sample or a census, defining the survey population, choosing a survey frame, identifying possible sources of survey error)

- Choosing a method of collection (self-enumeration, personal interviews or telephone interviews; computer-assisted versus paper-based questionnaires)

- Organizing and conducting data-collection operations

- Determining the sample size, allocating the sample across strata and selecting the sample

- Methods of point estimation and variance estimation, and data analysis

- Use of administrative data, particularly during the design and estimation phases

- How to process the data (which consists of all data handling activities between collection and estimation) and use quality control and quality assurance measures to minimize and control errors during various survey steps

- Disclosure control and data dissemination.

VIII. Making numbers better understood: Improving dissemination activities, including good practices for metadata and geo-referencing

In a globalized world in which information technology and computers support the use of statistical information, users need high-quality data that they can understand. They also need to be able to make efficient searches in a universe of data that's increasing every day in quantity and detail.

We must therefore improve data understanding and availability by using tools for documentation, dissemination and reporting. No one can speak of good practice in generating statistical information unless data are combined with their metadata and these metadata are constructed according to international standards.

Our organizations have made huge advances over recent years in making metadata available to users. Most of us now have some sort of online glossary, and many provide links to electronic versions of methodological manuals and texts. A problem, however, is that these documents are often not well adapted to the level and needs of the majority of data users.

Metadata provide detailed information about one or more characteristics of data, thus explaining their scope and limitations. They also encourage proper use of information. By standardizing metadata structures, we provide information about how components of an object are defined and organized. And in some cases we can use automated software tools for better metadata integration and management.

The increasing importance of statistical and geospatial metadata intended to be interpreted by computer applications (to make the end user's life easier) places more emphasis than ever on the value of using common standards for the metadata.

Today, information technologies allow representation of statistical information in formats that go beyond charts and graphs by enabling us to create online geospatial tools including thematic maps. Geographical references are part of information metadata and can be used to build these maps. Disseminating information in these new ways enables analysis of relations among statistical variables and geographical objects within the context in which a phenomenon occurs.

To build a story from statistical information requires a structure according to the intended purpose and audience. Our story should answer the following questions: Who did it? What happened? When did it happen? Where did it happen? Why did it happen?

The answers to these questions are what we call metadata, and in order to build interesting and complete information, they must always be presented along with

the figures. How we present metadata will depend on our audience, but the metadata must always be clear and relevant to the data they're linked to.

In this way, perhaps we need to consider two approaches to how metadata could be used: "traditional" metadata and "processing" metadata:

1. "Traditional" metadata are intended to be read and understood by humans. These metadata help users understand the nature of the data in depth, including assisting them in assessing data quality—where quality can be understood as "fitness for purpose" for the specific research/analysis/decision-making or other purposes that the particular user has in mind. "Quality" is to some degree based on the context of use—data that are of adequate quality for one purpose may not be of adequate quality for a different purpose. Different users/uses may need to focus on different aspects of the metadata to determine quality in the context of a particular purpose. For example, one user's purpose may require the data to be very up to date but not necessarily perfectly accurate. A second user's purpose might place the priorities on timeliness and accuracy. Different users/uses may place different emphases on statistical precision versus geospatial precision—with metadata to support judgements in regard to both being important.

2. "Processing" metadata constitutes another form of assistance to end-users. These metadata are intended to be interpreted and used by the applications that an end user may wish to use to work with the data. A good example is geospatial metadata, which allow data of interest to be interpreted and displayed by a geographical information system.

The ability to support geospatial data analysis comprises more than just an ability to produce and interpret maps. It is possible to think in terms of, e.g. "geo-enabled":

- Data discovery—what data do you have related to this place?
- Data visualization—e.g. mapping
- Data analysis—e.g. how many businesses of a particular type are located within 1km of a particular highway?

Geospatially enabled data can create new connections and meaning through merging different datasets (with some common dimensions) within a particular region. Also, cartographic visualization of statistical information allows its dissemination with geographical disaggregation without contravening the principle of confidentiality, as the values are presented by shades of colours and offers the potential to allow data discovery and data analysis.

Several international initiatives generate metadata for the statistical and geographical areas; both are necessary to assess usefulness of statistical information per se, as well as allowing it to be geo-referenced.

Statistical dissemination includes mechanisms not only to make information known, but also to expose it through statistical and geographical metadata. Good statistical presentation involves making it easy for readers to understand and interpret the data, and identify any key patterns or trends. Different standards do this job, and we'll be looking at some of them in the next section.

A. Metadata standards

Several international organizations draw up guidelines and standards for documenting and exchanging metadata. They establish reference frameworks for enriching statistical data sets with information that contributes to a better understanding of these data. The aim is to take advantage of the statistical and geographical information.

Some examples of metadata standards are:

Statistical metadata

- Data Documentation Initiative (DDI): A standard for documenting statistical data sets to facilitate re-use.

- ISO/IEC 11179: Establishes a register of metadata which focuses on managing semantics of data, as well as their representation and description.

- Statistical data and metadata exchange (SDMX): A set of technical standards and content-oriented guidelines to facilitate the exchange of data and metadata between organizations and computer systems.

Geographic metadata

- Mexico's Federal Geographic Data Committee (FGDC) standard. The Committee develops procedures and assists in implementing a distributed discovery mechanism for national digital geospatial data. The current Federal standard for geospatial data is the Content Standard for Digital Geospatial Metadata (CSDGM).

- ISO 19115: This standard allows generating regional, national and institutional profiles, for example, for the European Union, Colombia, Australia and New Zealand, Catalonia (Spain), Navarra (Spain), Valencia (Spain), Spain and Mexico.

Each standard provides a structured way to generate metadata, as well as specifications to ensure completeness and consistency. They do not, however, describe how software applications must operate with them, and must therefore be combined with other standards.

B. Metadata dissemination

Metadata dissemination provides formal mechanisms to access characteristics of some statistical or geographic information resource, so that users can evaluate its usefulness to meet their specific needs. The statistics and geography fields have always maintained a close relationship and work holistically to produce better data for decision makers.

The Internet is a natural dissemination scheme where geographically dispersed information can be integrated. With a single word or a geographic reference, users can be referred to geographic or statistical resources according to search criteria. If producer policies enable online access, users can access information resources directly through metadata.

Metadata describe concepts from the time in which a project was conceptually designed. For instance, objectives and constructs from collection instruments are valuable tools for understanding data and must be documented and disseminated to enhance interpretability—and transparency—of published information.

We can disseminate information in several dynamic ways using electronic devices. Each application, however, has characteristics that make it more or less suitable for presenting information to users with different backgrounds and skills. We must therefore look for tools that can be easily adapted to different needs in order to simplify our dissemination efforts.

In this sense, the Data Documentation Initiative (DDI) developed a web tool called the National Data Archive (NADA) that allows querying metadata of the projects documented in the DDI standard.

Queries based on keywords are useful for users with no previous knowledge about metadata use. In this way, the users can easily find projects related to a topic of their interest and also the methodological aspects of how the information was obtained.

Example 1: Historical statistics of Mexico - Information by State since 1910
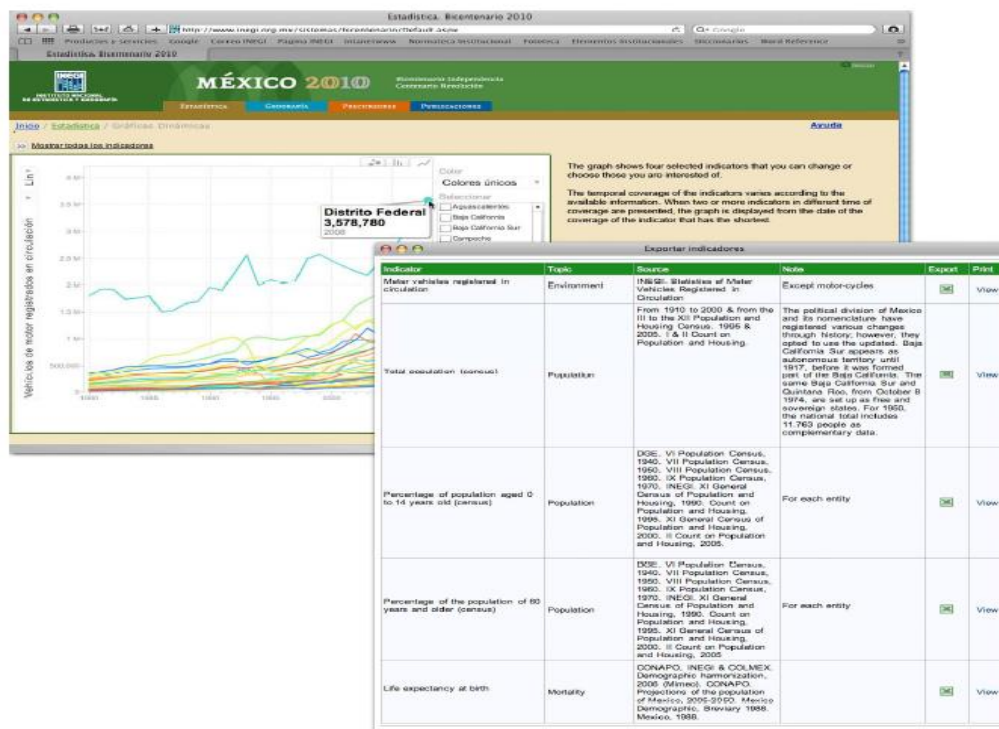
In Australia, some examples of how metadata can be linked to data include Census Quickstats (www.censusdata.abs.gov.au/) and National Regional Profiles (NRP) (www.abs.gov.au/). Census products that use published metadata such as the Census dictionary to provide descriptions and definitions of data items. Contextual links to the metadata are provided within the tables.

NRPs featured a map interface using Google Maps. They provide summary data from various data collections for geographic regions within Australia. Additionally, a set of seven online videos have been produced to show how to use and understand the NRPs.

Standards like SDMX can help us improve the exchange of data and metadata. Flows of complete information go from producers to consumers without distortion, and we (and the users) can build new stories in a clearer context.

Another advantage of using standards is that as they become more widely used, it's easier to find tools that can understand them, reducing time and costs to create software architectures to process and publish information in an easy and attractive way.

C. Geo-referencing information

If you're conducting a deep analysis of statistical information, you should also consider the territory in which a particular fact was generated or that it relates to. Linking statistical and geographical information takes us to a geo-referencing process.

Geo-referencing is locating information in a geographic environment to represent it through geographical names or codes to delimit areas. Examples of geographical codes are zip codes and electoral districts; and names serve to refer to boundaries of provinces, states, regions or municipalities.

Geographical coordinates expressed in terms of latitude and longitude form the base for geo-referencing. They're essential for generating maps and for taking advantage of information integrated in a geographical information system.

It's now possible to develop cartography with high precision and combine geographical and statistical information to answer complex questions, such as: How do the dynamics of earth and tectonic movements affect life in different regions of the world? What are the consequences of the inappropriate use of natural resources in terms of migration, lack of availability and pollution?

Increasing the level of spatial detail applied to the geo-referencing process opens more possibilities for spatial analysis of statistical data. Suppose that you have a variable that can be referred at a street level, or even better, at a block level. A set of data can be bounded and analysed by natural criteria, for example, blocks at the margins of a river or a lake, or within a distance from it.

The benefits of combining statistical and geographical data and metadata can be perceived through an example, like generating plans to define land use and to mitigate the impact of a natural phenomenon. In this case, we need to answer several questions:

- Where is the population at the point?
- What is the level of risk to which that population is exposed?
- What is the vulnerability?
- What is the terrain like?
- What are the options for evacuation and routes available for that purpose?

- Which infrastructure works are required to reduce levels of risk and vulnerability?

Projects to capture information from administrative records, as well as through censuses and surveys, also should consider geographic coordinates of the observation units beyond the codes that relate the clusters considered in the design of the collection instruments. One option for doing this is to store the geographic coordinates of external and internal numbers of houses that exist in communities.

Example: Geo-referencing of business units in Mexico at block level

Mexico's Instituto Nacional de Estadística y Geografía (INEGI) has created a web system to represent statistical information from business units into a digital map. Addresses of business units were geo-referenced and placed on the borders of polygons representing blocks. Users can build queries of activity sectors delimiting the geographical area up to locality level. The system replies to the user requests with a geo-referenced representation of the data.

Example: Geo-referencing of homes at the level of external number

It's possible to geo-reference dwellings maintaining the confidentiality of statistical data. The versatility that this provides for spatial analysis is very large and useful. To do this, we need to integrate houses' structures provided by different sources in a harmonized way; so Mexico has generated a technical standard on homes' geography to standardize these data.


TYPE: STREET
NAME: TABACHÍN
NUMBER ON STREET: 131
TYPE OF NEIGHBOURHOOD: FRACCIONAMIENTO
NAME OF NEIGHBOURHOOD: LAS ARBOLEDAS
POSTAL CODE: 20020
LOCALITLY NAME: AGUASCALIENTES
MUNICIPALITY: AGUASCALIENTES
STATE: AGUASCALIENTES

Application example: Geo-referencing of beneficiaries of social programmes

To increase transparency and certainty in the application of resources provided by social programmes in Mexico, sites of beneficiaries from one of the programmes were geo-referenced at the time the registry was updated.
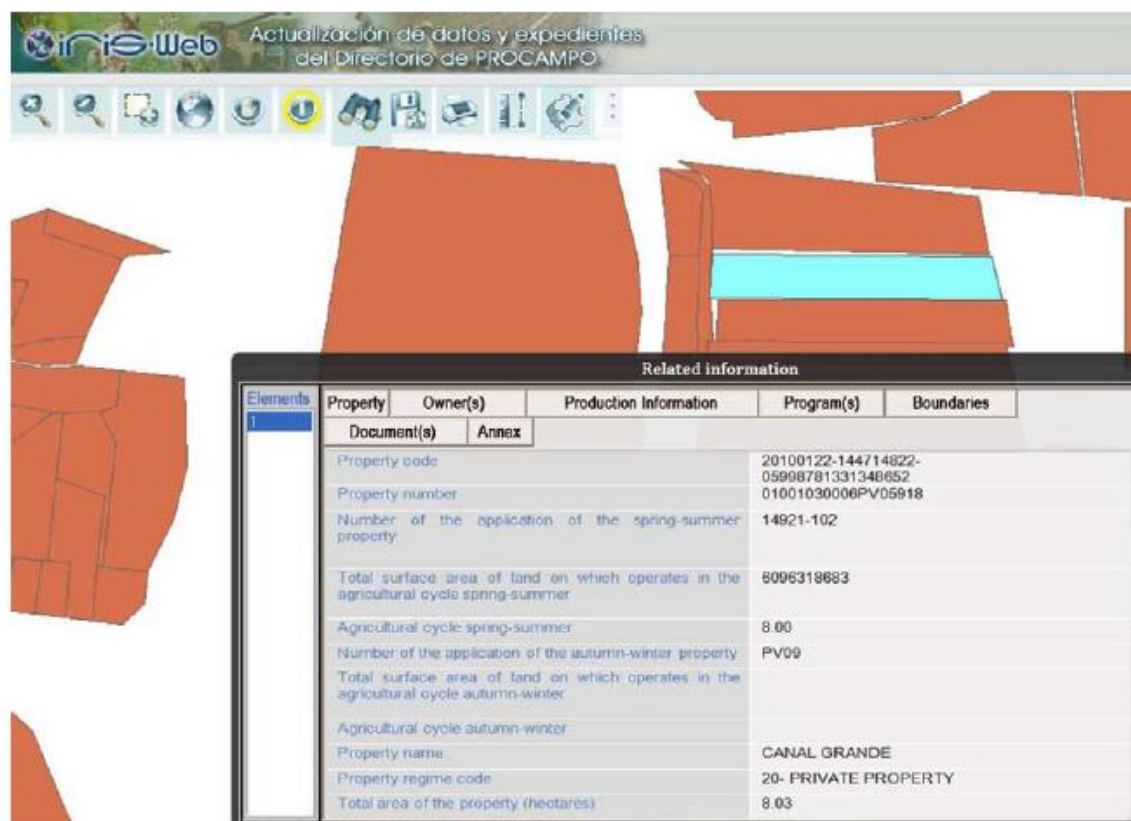
Final comments

Metadata do not appear spontaneously. They should be documented as the project progresses in order not to lose the wealth of knowledge we can gain from them. A good database to store statistical information should be designed taking account of which metadata will be provided.

The decision about which metadata to include isn't that simple. It requires experience to know what information is useful and what's not.

When generalist users come across metadata they don't understand, few will take the time and effort to try to develop that understanding. So, if we make metadata more understandable, users are more likely to take note of the messages in the metadata, thereby improving their understanding of the data, and helping to improve their statistical literacy.

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IX. Evaluating the impact of statistical literacy activities

A good understanding of statistical concepts and methodologies and proper interpretation of statistics are essential for the effective application of statistics. Statistical organizations have developed a range of activities for promoting statistical literacy to meet the needs of different users of statistics in society (or in the community). It seems reasonable, then, that each organization, which invests in increasing the awareness of official statistics and promotes the proper use of official statistics in the community, should be able to reap the benefits of this activity.

It's hard to measure the short-term paybacks of statistical-literacy activities, as the real return on investment will be long term. So, if your organization invests in statistical literacy, you'll need to be aware that the results of your investment will only be visible years after finishing the programme. It's useful, therefore, before starting your literacy programme to define both the evaluation strategy and the measurement criteria.

The most widely used and recommended measurement criteria include:

- Number of students and teachers trained, workshops provided, classes visited
- Number of access hits (monthly) to the learning resources website
- Number of educational websites linked to your organization's site
- Number and relevance of conferences and exhibits undertaken
- Number of new courses and textbooks that highlight data from statistical organizations
- Number of hours contributed to local schools by statisticians
- Number of statistical publications distributed to educators
- Amount of media coverage on educational activities
- Number of new lessons submitted by educators
- Requests for copyright or redistribution of data for the education community
- Number of telephone calls and Internet requests for information
- Numbers of communications materials distributed
- Letters, opinions, comments and testimonials received.

The team responsible for measuring the success of the literacy projects should produce annual measurement reports, which you should use as the basis for deciding on future activities.

Another way to measure the success of literacy activities is to make an evaluation strategy of literacy projects, including:

- An online survey of registered schools to assess the literacy project in general (website, registration process, questionnaire, teacher resources and data usage in the classroom)
- Teacher evaluation at conferences and training sessions
- Focus groups of teachers and students to explore more deeply issues raised by the online survey
- Telephone survey to identify issues preventing schools from continuing past the registration process

- Monitoring the use of the literacy part of your organization's website.

All improvements made as a result of the feedback received should be analysed and implemented.

The above activities for evaluating statistical literacy are country-oriented, i.e. they provide information only for the results within the country. However, globalization is raising the need for international comparability. This means that the success of a project should be evaluated using international standards, too.

Two projects: IALS and PISA

The Organisation for Economic Co-operation and Development (OECD), in cooperation with several international organizations, intergovernmental agencies and national governments, has launched two projects for evaluating literacy. The first is the International Adult Literacy Survey (IALS)—a comparative survey of adults designed to profile and explore the literacy distributions among participating countries.

As explained in the OECD publication *Literacy in the information age*,[2] literacy is measured using a sophisticated methodology:

- The IALS employed a sophisticated methodology developed and applied by the Educational Testing Service to measure literacy proficiency for each domain on a scale ranging from 0 to 500 points. Literacy ability in each domain is expressed by a score, defined as the point at which a person has an 80 per cent chance of successful performance from among the set of tasks of varying difficulty included in the assessment. Five levels of literacy that correspond to measured ranges of scores are used in the third report for analytical purposes.

- Level 1 indicates persons with very poor skills, where the individual may, for example, be unable to determine the correct amount of medicine to give a child from the information printed on the package.

- Level 2 respondents can deal only with material that is simple, clearly laid out, and in which the tasks involved are not too complex. It denotes a weak level of skill, but more hidden than Level 1. It identifies people who can read, but test poorly. They may have developed coping skills to manage everyday literacy demands, but their low level of proficiency makes it difficult for them to face novel demands, such as learning new job skills.

- Level 3 is considered a suitable minimum for coping with the demands of everyday life and work in a complex, advanced society. It denotes roughly the skill level required for successful secondary school completion and college entry. Like higher levels, it requires the ability to integrate several sources of information and solve more complex problems.

- Levels 4 and 5 describe respondents who demonstrate command of higher-order information processing skills.

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[2] www.oecd.org/education/country-studies/39437980.pdf

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The second project is called PISA (Programme for International Student Assessment). This is an internationally standardized assessment jointly developed by OECD and participating countries and administered to 15-year-olds in schools. Four assessments have so far been carried out (in 2000, 2003, 2006 and 2009). Tests are typically administered to between 4,500 and 10,000 students in each country.

PISA assesses how far students near the end of compulsory education have acquired some of the knowledge and skills that are essential for full participation in society. The results of the assessment should be used for:

- Creating a solid basis for developing national policy decisions on literacy.
- Defining the programmes in statistical offices for improving statistical literacy for target population groups.